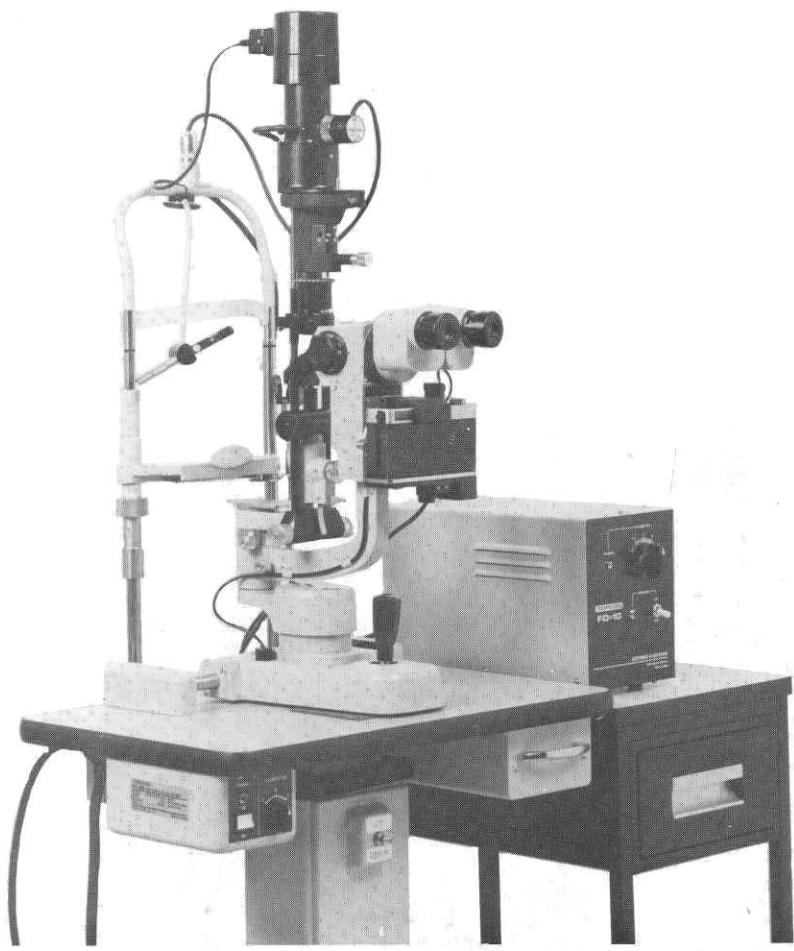


**TOPCON**

# **TOPCON PHOTO SLIT LAMP**

## **Model SL-6E**



Congratulations on your choice of the TOPCON Photo Slit Lamp, Model SL-6E, which is based on the time-proven Model SL-3E Slit Lamp and, retains almost all of its attractive features and specifications. We are sure that it will also give you years of unfailing service, as well as being an attractive instrument for your office.

This instruction manual covers the assembly, operation, care and maintenance of the TOPCON Photo Slit Lamp, Model SL-6E, for use on the TOPCON Adjustable Instrument Tables, Models AIT-5B and IT-1, and/or TOPCON Ophthalmic Stands.

May we suggest that you read this instruction manual carefully, in the order that it is written, before you even touch the instrument.

Thoroughly familiarize yourself with the instrument and you will be able to get the full benefit of a superior instrument.

## IMPORTANT

### READ BEFORE TOUCHING THE INSTRUMENT.

1. Please check the primary voltage and see that it matches that of your line current. If the primary voltage is different, it can be adjusted if you follow instructions on "Checking Voltage".
2. Please check the plug on the power cord, too. If it is not suitable for the receptacle, it can be exchanged or attached (if not connected) by following instructions on "Checking the Electric Plug".
3. Do not touch the surfaces of lenses and mirrors with your fingers or any hard object.
4. Do not switch the light on unnecessarily.
5. Always turn the power switch④ to OFF when connecting the power cord to the line current or when exchanging lamps.
6. When disconnecting the power cord, or any other cord, grip the connector or plug firmly and do not pull the cord.
7. Do not change the flash control switch setting while the Xenon flash lamp is discharging or while it is being charged, as this will lead to troubles in the power supply unit.
8. Do not depress the shutter release button⑪ while the film winding of the auto winder. Otherwise, the auto winder will stop midway.
9. Do not depress the shutter release button for a long time.
10. Do not take a picture beyond the normal exposure number.
11. Do not leave the instrument in a location which is too dusty, has excessive moisture or where the sun will hit it directly.
12. Always keep the instrument covered with the vinyl dust cover, except when in actual use.
13. Please note that there may be minor differences in the actual instrument delivered to you which are not covered in this instruction manual because such improvements do not differ greatly from the instructions and/or illustrations.

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## 1. FEATURES OF THE TOPCON PHOTO SLIT LAMP, MODEL SL-6E

- 1) The convenient, one position control lever allows the base to be guided freely in fine cross-slide adjustment and vertical movement.
- 2) The convergent binocular tubes allows easy and natural stereoscopic observation.
- 3) Camera can be attached without cluttering microscope area and without hampering slit lamp operations.
- 4) Unit construction photographic system and observation tube makes attachments and exchanges very simple.
- 5) Stereophotographs can be taken very easily, with one shot, by simply exchanging the normal photographic attachment.
- 6) Five magnification changes for observation and photography, with higher magnification also possible by interchanging eyepieces.
- 7) Photographs are possible, with simple auto-winding operations, by simply depressing the release button on the joystick control lever.
- 8) Background illumination can be added to the slit lamp photograph, as well as adjusted in brightness.
- 9) A beam splitter unit is inserted between objective and the prism housings, with the observation tube fixed to either of the two beam splitter mounts on the unit. As in the case of the photographic unit, the optical path is partially diverted only when the observer uses a lever for this purpose.
- 10) Goldmann Applanation Tonometers T900 and R900 can also be used.

Model R 900

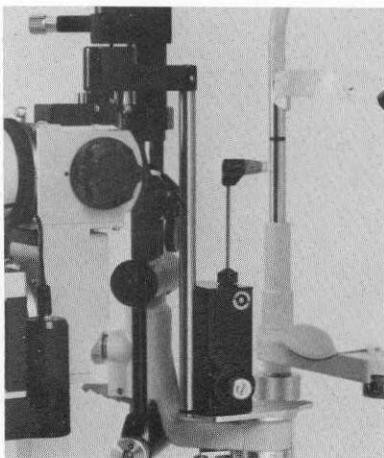


Fig. 1

Model T 900

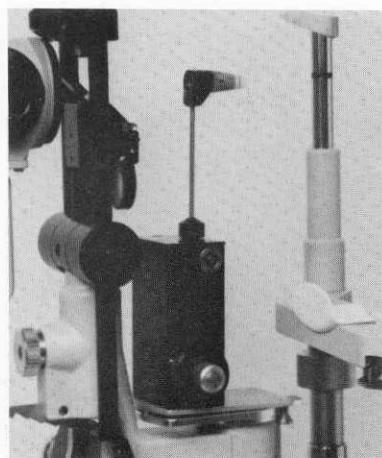


Fig. 2

## 2. SPECIFICATIONS

### Microscope

Type	Galileo type direct viewing binocular stereoscopic microscope, with erect image
Objective	$f = 106.6\text{mm}$
Working distance	100.2mm
Magnification changing system	Revolver drum, with 5 magnification changes
Eye pieces	12.5 $\times$
Total magnifications and field of view	6 $\times$ (33mm $\phi$ ), 10 $\times$ (22.5mm $\phi$ ), 16 $\times$ (14mm $\phi$ ), 25 $\times$ (8.8mm $\phi$ ) and 40 $\times$ (5.5mm $\phi$ )
Interpupillary distances	55mm to 75mm
Diopter adjustments	+3D to -5D

### Slit illumination system

Projection magnification	2/3 $\times$
Illuminated field	Continuously variable from 0 to 9mm (field of view is round at 9mm)
Slit width	Continuously variable from 1mm to 8mm
Slit length	7 stops, 9, 8, 5, 3, 2, 1 and 0.2mm $\phi$
Aperture diameters	Consecutively variable from vertical to horizontal: horizontal scanning through 180° from zero; slit projection can be inclined to 5°, 10°, 15° and 20°
Slit angle	Blue, red-free, 13% neutral density and heat absorbing filters built in.
Filters	6V 27W precentered tungsten filament lamp; brightness adjustable in 3 stages
Lamp	

### Fixation Targets

Annular type	Adjustable from -15D to +10D
Luminous type	Interchangeable with annular target
Lamp	6V 0.2A

### Base

Longitudinal movement	80mm
Lateral movement	100mm
Fine cross-slide adjustments	12mm in both longitudinal and lateral directions
Vertical movement	30mm
Chin-rest vertical range	80mm

### Power Unit:

Primary	50/60 Hz; AC 100V, 120V, 220V and 240V; adjustable with built-in voltage selector
Secondary	AC 4.5V, 6.3V and 7.5V; adjustable with rotary switch
Power consumption	45VA

### Standard Accessories

Hruby lens	-58.7D, for examinations of the vitreous body and fundus
Hruby lens guide plate	Also doubles as mount for Goldmann Applanation Tonometer T900. (Hruby lens and Hruby lens guide plate are optional accessories for certain markets.)

### Dimensions & Weight

Table surface	560mm x 350mm
Height from table surface	740mm
Weight (Body)	21 kgs.

### Optional Accessories

#### 35mm Photographic attachment set for normal photography

Optical axis for photography	Right side
Photographic magnifications	0.9X, 1.4X, 2.2X, 3.5X
Camera body	Exclusive TOPCON camera with Auto Winder
Flash illumination	280V 200WS Xenon flash lamp; also used for background illumination 2 stages brightness adjustment and black-out
Power unit	
Primary	50/60 Hz; AC 100V, 120V, 200V, 220V and 240V; adjustable with voltage selector
Secondary	Adjustable in 5 stages 20, 40, 80, 160 and 200WS
Power consumption	300 VA

#### Stereo Photographic attachment

Photographic magnification	0.6X, 1X, 1.6X, 2.6X
----------------------------	----------------------

### Observation Tube

Type
------

Beam splitter mount type, with optical path moved in/out as required; can be attached on either of two attachment mounts of beam splitter unit; built-in image rotator prism

### Adjustable Instrument Table

There are two types of adjustable instrument tables available.

#### Model AIT-5B

A motorized table which provides exceptionally stable support for most instrumentation. The table can raise or lower instruments weighing up to 80kgs throughout the full 250mm range. The minimum table height is 669mm while the maximum height is 919mm. Activation of the motor is through a switch located in the center of the support pedestal. Four large diameter rubber casters, two with locking devices, allow for easy positioning. A convenience electrical outlet is located at the base.

#### Model IT-1

This manually adjustable instrument table provides a sturdy and stable support for instruments weighing up to 27kgs. The verticle adjustment range of 250mm is from 686mm to 936mm. Four large diameter rubber casters provide for smooth movement, with two of the casters having locks to prevent any movement during diagnostic procedures.



Fig. 3                    AIT-5B



Fig. 4                    IT-1

#### **Ophthalmic Stands**

There are several types ophthalmic stands available for use with SL-6E, which all have an electrical outlet for utilization by the instrument.

The optional accessory and equipment noted above are available against special orders and extra cost. They are all recommended for optimum performance of the TOPCON Photo Slit Lamp. At the same time, it should be noted that there may be changes in these accessory and/or equipment in the future.

Subject to changes in designs and/or specifications, without advance notice.

### 3. NOMENCLATURE

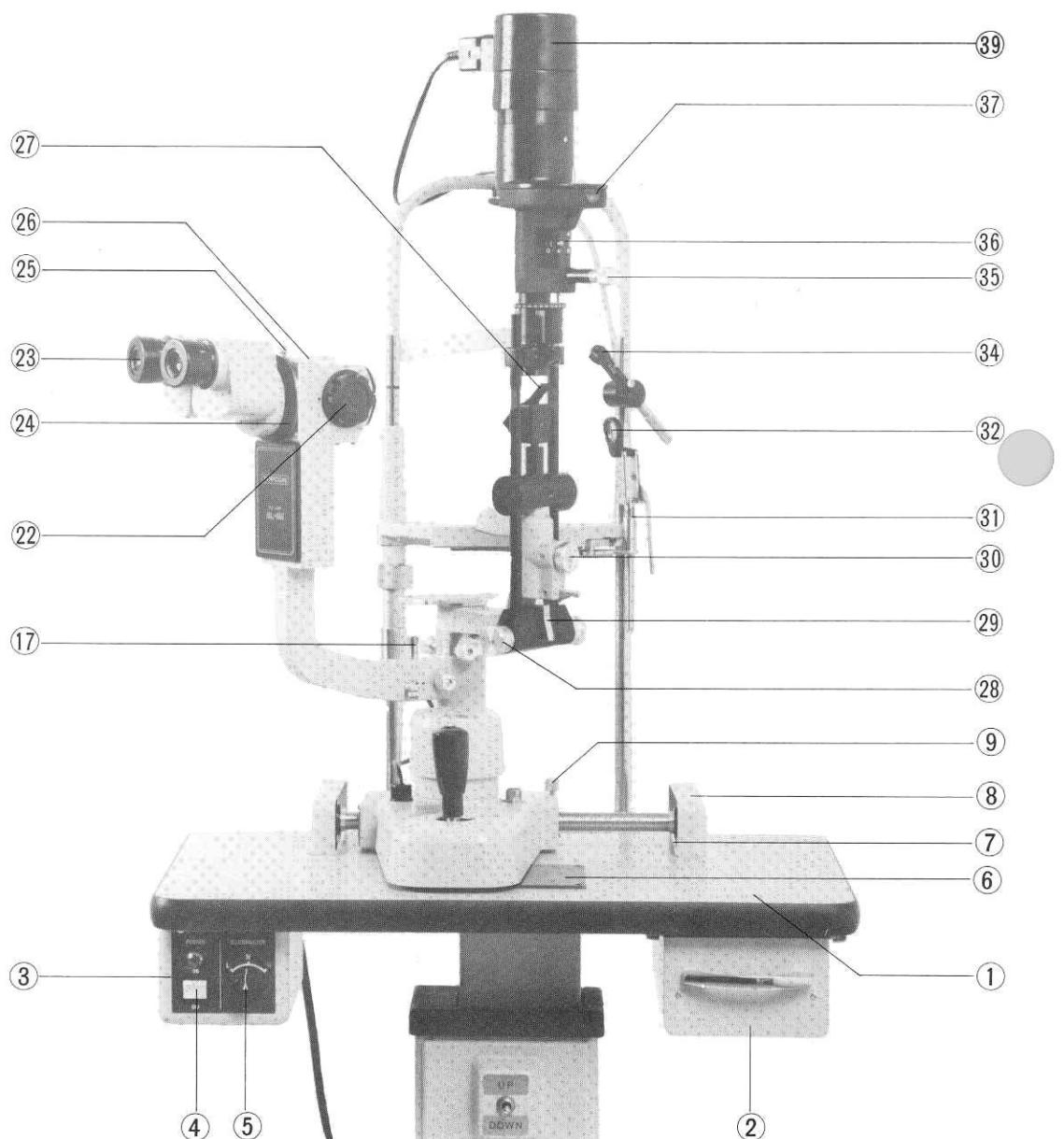


Fig. 5

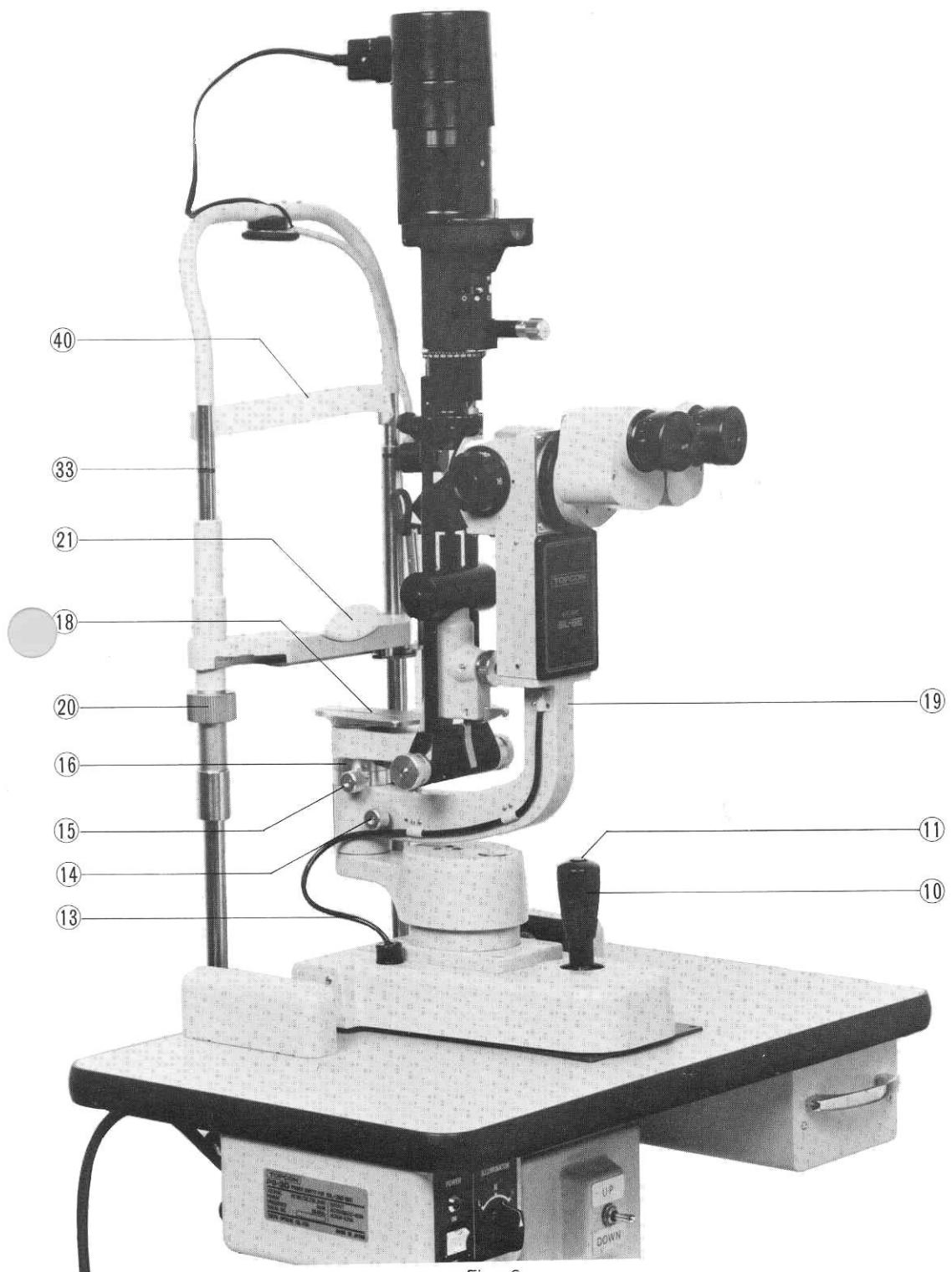


Fig. 6

① Table	Exclusive table for use on the TOPCON Adjustable Instrument Table, Model AIT-5B or Model IT-1. Has gliding plate and twin toothed rails, for providing the cross-slide base section with free moving capability for locating the instrument. (Replaced with smaller exclusive table for use on TOPCON Ophthalmic Stand but with same gliding plate and toothed rails.)
② Accessory drawer	Provided on the above table only for storage of standard accessories, such as eyepiece lenses, mirrors, test rods, etc. (Not available on table for use with Ophthalmic Stand.)
③ Power unit	Available on both types of tables with built-in step-down transformer for use with AC 100, 120, 220, and 240 volts, as set with voltage selector ④. Main switch for the power unit.
④ Power switch	Has three settings or —L(4.5)—N(6.3)—H(7.5). Used for controlling secondary voltage to the slit lamp and, consequently, brightness of the slit image.
⑤ Illumination control switch	Provides the cross-slide base with free movement in all directions and, therefore, must be kept clean and smooth.
⑥ Gliding plate	Toothed rails are provided for accepting the twin rollers of the base, and provide longitudinal movement.
⑦ Rail	Snap-in covers are provided for both toothed rails ⑦.
⑧ Rail cover	Used to fix the base from moving. Loosened by counter-clockwise revolution and tightened by clockwise revolution.
⑨ Base fixing screw	The tip of this lever is tilted slightly, in the required direction, for making fine adjustments in the position. Also, used to elevate or lower the instrument by rotating the lever.
⑩ Control lever	For releasing shutter of the camera body.
⑪ Release button	Between the base and the microscope.
⑬ Connected cord	Locks microscope arm ⑯ from rotating; when loosened, permits rotation of the microscope arm.
⑭ Microscope arm fixing knob	Couples slit lamp arm and microscope arm ⑯ when tightened; slit lamp arm rotates alone, when loosened.
⑮ Slit lamp arm fixing knob	Scale is used for reading the angle between the microscope arm ⑯ and the slit lamp arm.
⑯ Protractor scale	The click-stop roller indicates when the slit lamp arm is at 0°, or central position, or 10° to the right or left of the central position.
⑰ Click-stop roller	Used for coupling Hruby lens, when placed in the socket of the rotation axis of the microscope and slit lamp arms. Also for use as tonometer mount in coupling Goldmann Applanation Tonometer Model T900.
⑱ Hruby lens guide plate	Can be rotated freely or in coupled movement
⑲ Microscope arm	

⑳ Chin-rest adjusting wheel  
㉑ Chin-rest

㉒ Magnification changer handle

㉓ 12.5× eyepiece lenses

㉔ Fixing ring

㉕ Beam splitter lever

㉖ Tonometer mount

㉗ Mirror

㉘ Slit width adjusting wheels

㉙ Slit inclination stopper

㉚ Centering knob

㉛ Hruby lens attachment mount

㉜ Hruby lens

㉝ Level marker

㉞ Annular fixation target

㉟ Slit diaphragm plate handle.

㉟ Filter lever

with the slit lamp arm.

Used for adjusting the height of chin-rest⑳.

Supports the patinet's chin and can be adjusted up or down, to locate the patient's eyes at the correct height.

Rotated for making five changes in magnification.

Sleeve insert type eyepiece lenses.

The ring is revolved, the prism housing can be detached. After that, the align the pin of the beam spliter Unit to its notch

For photography, the lever must be pushed IN.

For use of Goldmann Applanation Tonometer Model R900.

Reflection mirror for the slit illumination system. Long mirror can be exchanged for the short mirror⑮, in cases where the long mirror obstructs the microscope's lines of sight.

Either wheel can be used for adjusting the width of the slit illumination from 0 to 9mm, by rotating in either direction.

Stopper plate for 5° intervals in the inclination of the slit illumination system up to 20°.

The knob is loosened, by counter-clockwise revolution, which will permit movement of the slit image away from the center of the field of view.

A sliding mount used for attachment of the Hruby lens. Can be located over the guide plate for use in front of either eye.

Used on the Hruby lens attachment mount㉛ coupled to the guide plate⑮, for examinations of the vitreons body and the fundus.

Used to indicate the proper height for the patient's eyes, as adjusted by raising or lowering the chin-rest.

Adjustment from -15 to +10 diopters, to suit patient's refractive power.

Rotation around the axis of the handle produces 7 aperture changes of 9, 8, 5, 3, 2, 1 and 0.2mm, which is then followed by infinitely variable changes in the slit length from 1 to 8mm, as indicated on the slit diameter/length scale㉗. There are also click-stops at the 1 to 8mm settings, in the latter case. Swinging the same handle in the horizontal plane will also rotate the slit image consecutively from the vertical to the horizontal in both directions.

Used for insertion of 4 filters or heat absorbing, 13% neutral density, red free and blue, as well as an open aperture at the beginning.

The filters and open aperture are indicated by symbols or an open circle, a grey colored, a circular, a green-colored round and a blue-colored indexes.

- ③⑦ Slit diameter/length scale. Shows 7 click stop apertures and the infinitely variable slit length produced with the slit diaphragm plate handle.
- ③⑧ Setting pin for background illumination When the background illumination hit the patient's fore head, it is stored on the pin.
- ③⑨ Lamphouse cover Encloses the slit illumination lamp.
- ③⑩ Head rest
- ③⑪ Fuse holder
- ③⑫ Voltage selector Can be adjusted for primary voltages of AC 100, 120, 220, or 240V.
- ③⑬ Power cord
- ③⑭ Cord holder
- ③⑮ Head rest attachment plate

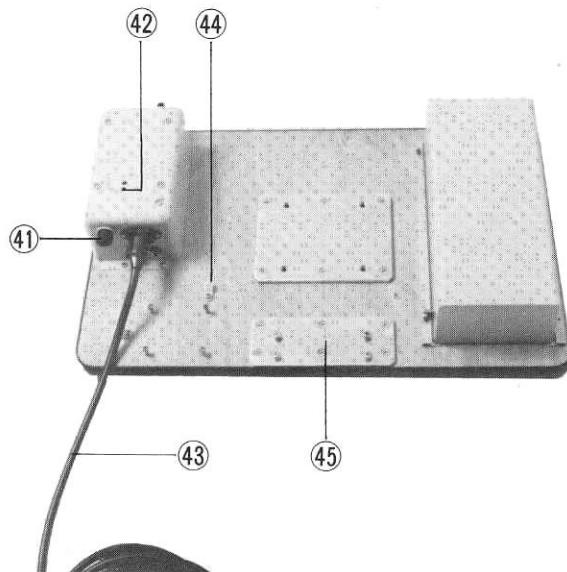


Fig. 7

- ④7 Slit illumination lamp
- ④8 Test rods
- ④9 Chin-rest pads
- ⑤0 Luminous fixation target
- ⑤1 Short mirror
- ⑤2 Fuse

Exposed when lamphouse cover③9 is detached.  
For use in adjusting the eyepiece lenses to the user's eyesight.  
Used on the chin-rest for providing a clean, hygenic surface for each patient.  
Used in place of the annular fixation target.  
Used in place of the long mirror when the lines of sight of the microscope is obstructed.  
Glass-shielded fuse.

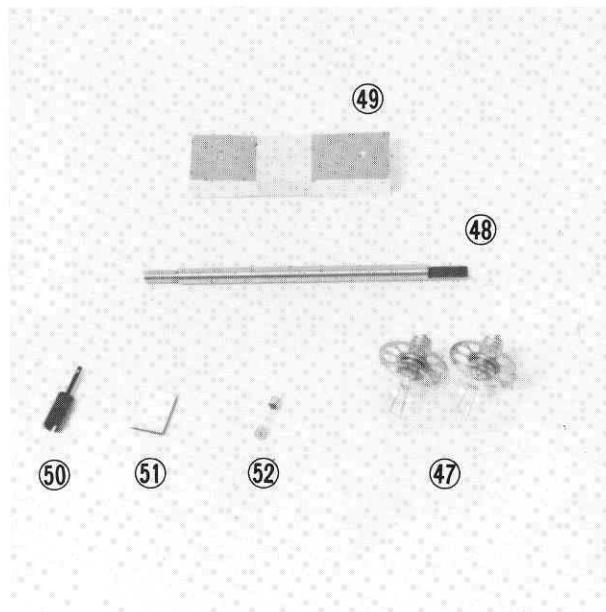


Fig. 8

## 4. ASSEMBLY

### 1) Unpacking the instrument

SL-6E is disassembled and packed carefully for export shipments.

Normally, the instrument (Body and standard accessories) is packed in one styrofoam box, with cut-outs for inserting individual parts.

(Remarks: Optional accessories are packed separately)

① Table, with power unit and accessory drawer	1 each
② Convergent binocular tubes	1 each
③ Base section	1 each
④ Illumination section and lamps	1 each
⑤ Chin-rest and head rest section	1 each
⑥ Rail cover	1 pair
⑦ Hruby lens guide plate.	1 each
⑧ Long mirror(spare)	1 each
⑨ Hruby lens	1 each
⑩ Power cord	1 each
⑪ Slit illumination lamp (spare)	2 each
⑫ Test rods	1 each
⑬ Chin-rest pads	1 pack
⑭ Luminous fixation target	1 each
⑮ Short mirror	1 each
⑯ Fuse (spare)	1 each
⑰ Vinyl dust cover	1 each
⑱ Cleaning brush	1 each
⑲ Instruction manual	1 each
⑳ Screw drivers and a Spanner	total 3 pes.

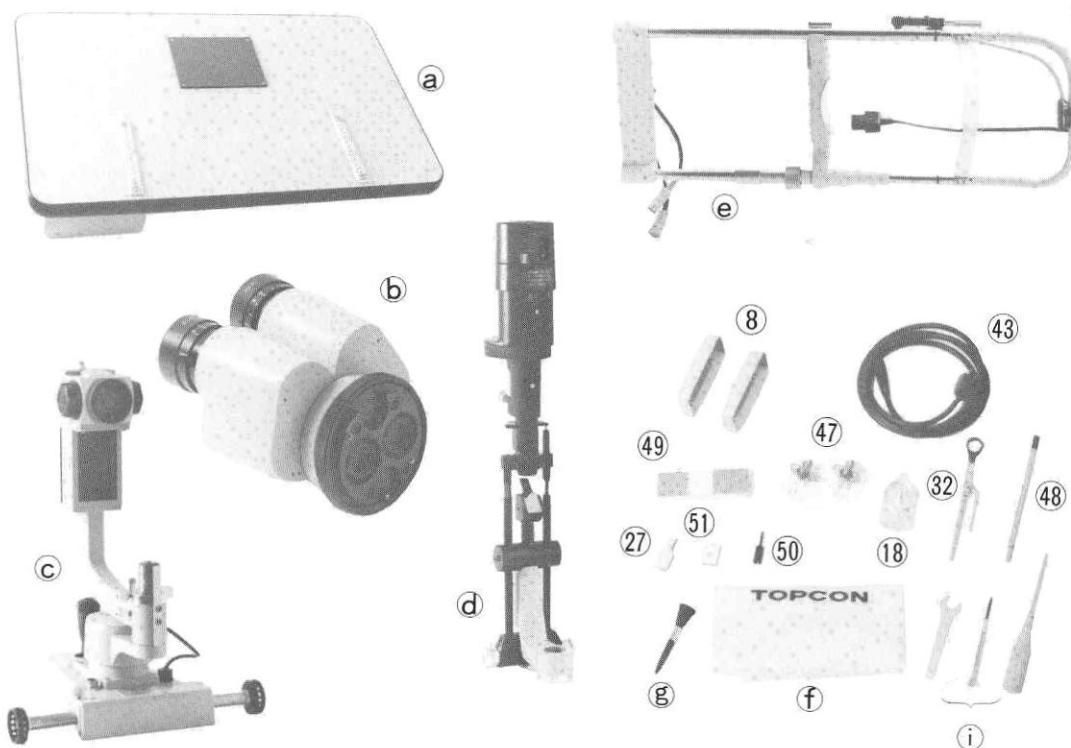


Fig. 9

## 2) Assembling and Installation

### (1) Checking the plug and the voltage

Before actually assembling the instrument, first check the primary voltage of the instrument and the electric plug connected to the power cord. Next, check the voltage set with the voltage selector④.

### (2) Installation of the Instrument

The Slit Lamp can be used on top of the TOPCON Adjustable Instrument Table, or on the lower instrument arm of the TOPCON Ophthalmic Stand, as well as being used on other similar equipment.

As noted, however, Model SL-6E is available with two types of table or an exclusive table① for use on the adjustable instrument table, which is larger and has a power unit and an accessory drawer, and an exclusive table for use on the ophthalmic stand, which is smaller, has a power unit only and also a protrusion or short pole for fitting the socket on the lower instrument arm.

#### a) Attachment on the TOPCON Adjustable Instrument Table.

Mount the table of the instrument on the adjustable instrument table using four mounting bolts M8 x 20mm with spring washers. Slightly raise the AIT-5B whose vertical movement is set to the lower limit to be deterrent to bolt insertion.

Note: Check the input voltage and fuses before moving the adjustable instrument table.

Allow the side of the power supply panel of ② and the vertical operating side of the adjustable instrument table to face in the same direction, have the mounting holes aligned, place ② on the adjustable instrument table, then tighten the bolts with a spanner.

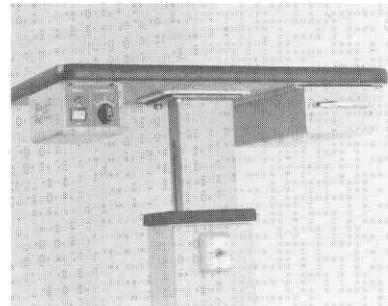


Fig. 12

#### b) Attachment on the Ophthalmic Stand

Remove the tape which holds the plastic washer on the shaft under the stand.

With the plastic washer attached, insert the shaft into the hole of the ophthalmic stand arm.

Note: When using the table, the ophthalmic stand is provided with a power supply to render the unit right-handed for the inspector. If the ophthalmic stand is installed left-handed, it may cause the power supply to come in contact with the arm, so that remove the power supply (by removing 4 wood screws) and mount it right-handed.

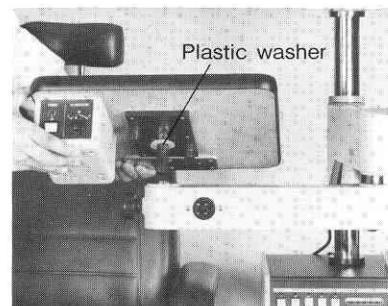


Fig. 13

### (3) Attachment of the Chin-rest and Head Rest Section

Unscrew, with the screwdriver four(4) attachment screws on the chin-rest attachment mounted below the table. Place the cord in the gap between the chin-rest attachment plate and the table and confirm the cords are not caught between plate and chin-rest section, fix the chin rest section with four screws.

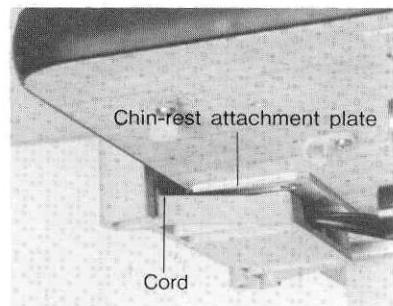


Fig. 14

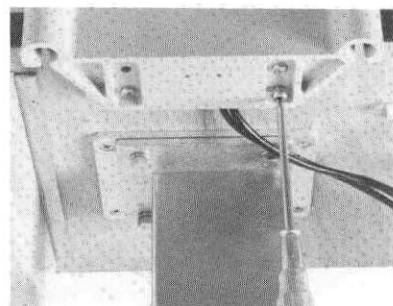


Fig. 15

### (4) Connecting the cord

Connect the cords of chin rest section and power cord to the power supply. Remove the cord holders ④. Pass the cord through the cord holder ④ fitted to the lower face of table and fix it.

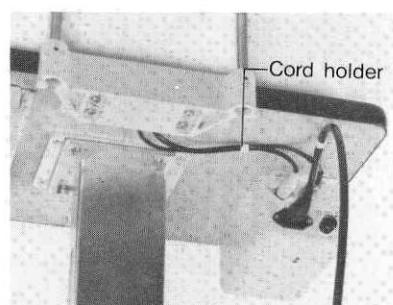


Fig. 16

### (5) Checking the electric plug

Check whether the electric plug connected to the power cord matches that of

the room receptacle. If not, exchange it for a suitable one. On the other hand, the electric plug may not be connected at all, because of specialized requirements in your region, in which case, connect a suitable plug.

There are three electric wires in the power cord.

Among three wires, the green/yellow(or green) wire should be connected to the grounding terminal.

#### (6) Setting up the Base

Simply place the base section on top of the table①, with the outrigger rollers aligned on top of the toothed rails ⑦.

Next, insert the rail covers⑧ in place, over the rails. Insert the flange, on the base of the cover, between the slight opening which exists between the rail and the surface of the table. (See Fig. 17)

Tighten the base fixing screw⑨ to facilitate further work.

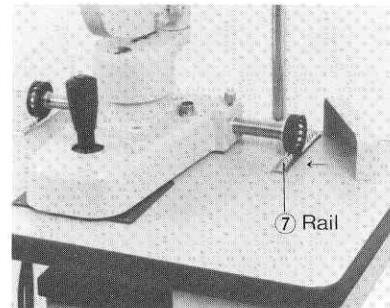


Fig. 17

#### (7) Attachment of the Slit Lamp Arm

Loosen the microscope arm fixing knob screw and rotate the microscope arm ⑯ 60° or 90° to the right or left, from its central position, which will be more convenient for attaching the slit lamp arm.

Next, loosen the setscrew protruding on the outside of the slit lamp arm's attachment socket so that it no longer protrudes inside the socket.

Finally, lower the slit lamp arm carefully into position, as in Fig. 18, while, at the same time, lining up two red dots. When properly aligned, screw in the setscrew tightly, as in Fig. 19, so that the slit lamp arm cannot be detached.

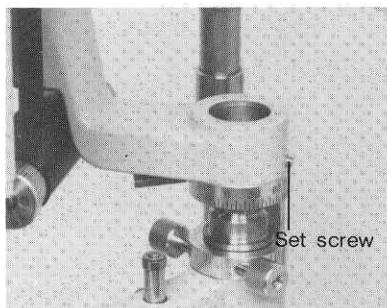


Fig. 18

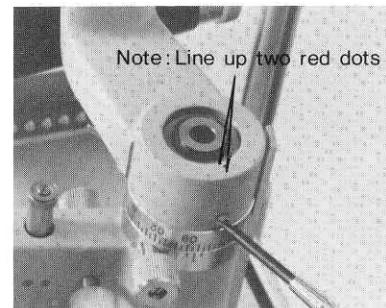


Fig. 19

Connect the cord which is found on the chin-rest with the Lamphouse cover⑩

### (8) Fixing the Chin-Rest Pads

Pull out the pad fixing pins, on both sides of the chin-rest, by, first, pushing them up from below.

Next, take a suitable quantity of the pads and place them on top of the chin-rest. Finally, fix them in place, by passing the two pad fixing pins through the openings of the pads. (See Fig. 20)

Tear off one tissue pad each, after examining a patient, which will place a new one in place for the next patient.

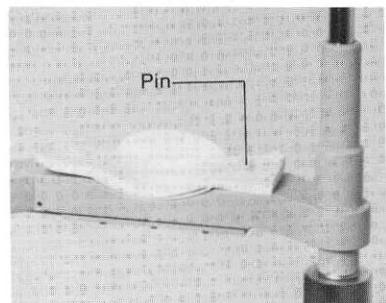


Fig. 20

### (9) Storage of Accessories

Store the standard accessories supplied with the instrument in the accessory drawer②, as shown in Fig. 21, in the case of table①.

When the Slit Lamp is used on the lower instrument arm of the ophthalmic stand, there is no accessory drawer and the standard accessories should be stored in the box supplied for this purpose. (See Fig. 22)

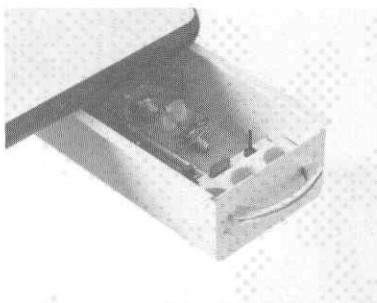


Fig. 21

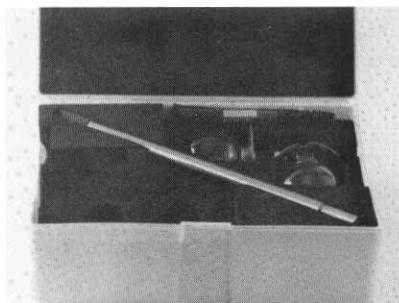


Fig. 22

## 5. OPERATIONS

### 1) Preparations

- (1) Use the instrument in a dark room
- (2) Insert the plug of the power cord④ into the nearest convenient room receptacle  
Confirm that the grounding was completed
- (3) Set the beam splitter lever to "OUT".  
("IN" is used in case of photography)  
Insert the test rods⑧ into the opening on top of the post around which the microscope arm and slit lamp arm rotate
- (4) Switch on the power switch④ and check whether the slit illumination lamp⑦ and the fixation target lamp are illuminated or not.
- (5) Project a suitable slit image on the test rod⑧.  
Revolve the slit width adjusting wheel⑧ to adjust the width of the slit and revolve the milled knob of the slit diaphragm plate handle⑤, around the axis of the handle, to change the length of the slit.
- (6) The cross-scales seen in the field of view of one of the eyepieces④ is used for adjusting the eyepieces to the user's eyesight. (The cross-scales can be placed in the field of view of either eyepiece, as found suitable.)  
The eyepiece, in which the cross-scales can be seen, should be used for making dioptric adjustments for both eyes of the operator, with the required dioptric power for the other eye transferred to the other eyepiece.

Dioptric adjustments are made by, first, drawing out the eyepiece lens fully, by revolving the eyepiece adjustment ring. This will result in the cross-scales appearing blurred and indistinct. Next, slowly turn the eyepiece adjustment ring in, until the cross-scales are seen clearly and distinctly and then stop. If the eyepiece adjustment ring is revolved beyond the point of clear focus, then draw the eyepiece lens out completely once and repeat the adjustment.

The eyepiece adjustment ring has a dioptric scale engraved on it, with each scale division representing one diopter. If you can remember the dioptric adjustments for both eyepieces, it will only be necessary to set the adjustment rings to the required settings on the scales of the eyepieces, without going through the above adjustments each time. (Fig. 23)

### (7) Adjust the pupillary distance.

The pupillary distance between the binocular eyepieces is adjusted by simply rotating the prism housings outwards to increase the distance and inwards to decrease the distance.

The adjustment range is from 55mm to 75mm, (See Fig. 24)

When the pupillary distance is adjusted

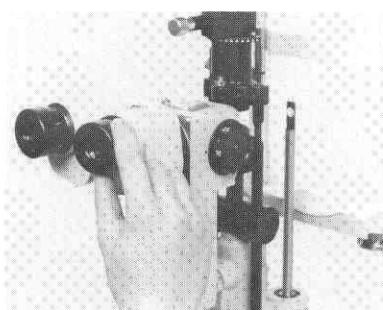


Fig. 23

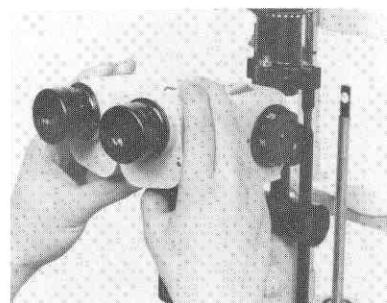


Fig. 24

properly for the user's eyes, the left and right fields of view will coincide completely.

A really satisfactory stereoscopic examination is only possible when the individual eyepieces are focused carefully for both eyes of the user and the pupillary distance is also carefully adjusted. Therefore, it is very important that these adjustments be made carefully before conducting any examination with the instrument.

(8) Check the slit image on the test rod.

The slit image focused on the test rod<sup>④⑧</sup> must be checked under the following two conditions :—

- Tighten the slit lamp arm fixing knob<sup>⑯</sup> and rotate the slit lamp arm and microscope arm together around the upright post (see Fig. 25), and.
- Loosen the slit lamp arm fixing knob<sup>⑯</sup>, tighten the microscope arm fixing knob<sup>⑯</sup> and rotate the slit lamp arm only around the upright post (see Fig. 26)

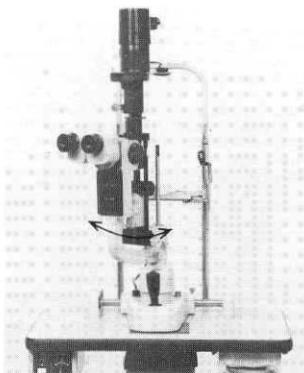


Fig. 25

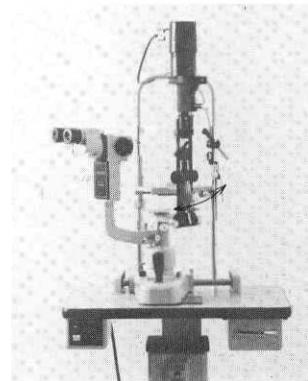


Fig. 26

In both instances, the slit image should not appear to move, should stay in the center of the field of view of the microscope and should also not become blurred and indistinct.

The test rod is used to check whether the slit lamp and microscope are rotating around the same axis and whether the slit lamp and microscope are focused on the identical plane.

The accuracy of the instrument should be checked, from time to time, in the above manner.

## 2) Examinations

### (1) Seat the patient.

Have the patient sit down before the instrument, with the chin placed on the chin-rest<sup>⑯</sup> and the forehead against the head rest<sup>⑯</sup>.

Rotate the chin-rest adjusting wheel<sup>⑯</sup> so that the patient's eyes are approximately level with the level marker<sup>⑯</sup>.

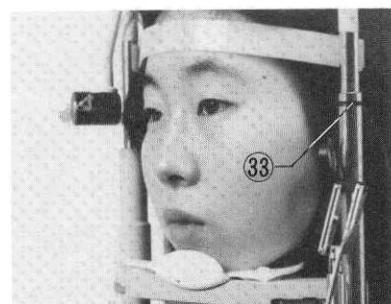


Fig. 27

(2) Adjust brightness of the slit illumination.

At first, switch on the power switch④. Next the slit lamp is illuminated when the illumination control switch⑤ is set to L(4.5) N(6.3) or H(7.5) with the brightness of the illumination increasing in three steps, as the voltage is increased (as indicated by these figures). When the lamp is set to H, the lamp is overloaded considerably, with a consequent increase in brightness and a shortening of the service-life. Using the lamp at L means that the service-life of the lamp can be extended. The illumination control switch should be set to the lowest permissible setting. (See Fig. 28)

(3) Fixing the patient's line of sight.

The patient's line of sight is fixed, by having the patient fixate the fixation target with the eye that is not being examined. The direction of the line of sight is changed by simply adjusting the position of the fixation target, as found suitable. (See Fig. 29)



Fig. 28

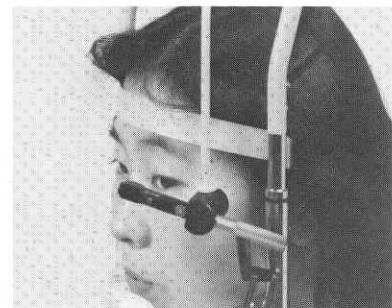


Fig. 29

Two types of fixation targets are available with the instrument. One is the annular fixation target, with dioptic adjustments (see Fig. 30), while the other is the luminous fixation target (see Fig. 31).

The latter is attached to the fixation target, in place of the front half of the annular fixation target which is detached.

The annular fixation target is adjusted for the patient's refractive power with the fixation target adjustment lever, in order that the target is located at the far point of the patient's eye, thus eliminating accommodation while fixating the target, as well as convergence. The range of adjustment is from -15 through 0 to +10 diopters.

The luminous fixation target is a simple one. Detach the end with the annular target and attach the luminous fixation target in its place, leaving the balance of the fixation target, with the lamp, in place.

Do not loose the fixation knob too much in case of exchanging because it is worried about the dropping down of the knob.

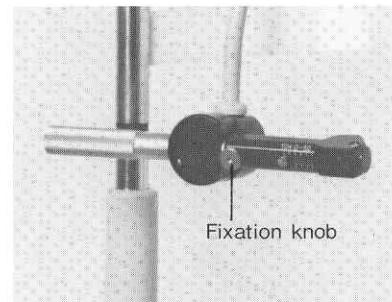


Fig. 30

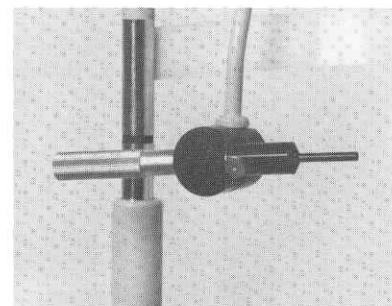


Fig. 31

(4) Focus the slit image on the iris.

The slit image should be roughly focused on the iris of the patient's eye, at this time, with the naked eye, i.e., not through the microscope.

First, loosen the base fixing screw⑨ which will permit free movement of the base in the horizontal plane. The tip of this lever is tilted slightly, in the required direction, for making fine adjustments in the position. Also, used to elevate or lower the instrument by rotating the lever.

The slit image should be finely focused, after adjusting the width and length of the slit image, etc.

(5) Adjust the slit width.

Rotate one of the two slit width adjusting wheels⑩ which will produce continuously variable changes in the width of the slit image, from 0 to 9mm. At 9mm, however, the slit will simply become a circular patch of light. (See Fig. 33)

These wheels can be rotated in either direction, as the cycles are continuously repeated.

(6) Adjust the slit length.

Rotate the knurled knob of the slit diaphragm plate handle⑪ around the axis of the handle which will produce seven changes in the slit length of 9mm, 8mm, 5mm, 3mm, 2mm, 1mm and 0.2mm, followed by infinitely variable changes from 1mm to 8mm, with click-stops at the 1mm and 8mm setting, in the latter case.

If the slit should be opened to its maximum width, at this time, the former changes will produce circular beams of 9mm, 8mm, 5mm, 3mm, 2mm, 1mm and 0.2mm diameters respectively.

The changes in lengths (diameters) produced by the seen apertures, as well as the infinitely variable slit lengths produced by a wedge-shaped diaphragm, are indicated on the slit diameter/length scale⑫ over the slit diaphragm plate handle. The scale for the infinitely variable changes has a minimum division of 0.1mm.

(7) Rotating the slit.

Rotating the slit diaphragm plate handle⑪ around the vertical axis of illumination in the horizontal plane, will, on the other hand, rotate the slit image continuously through 90°, from the vertical to the horizontal, with click-stops at the vertical, oblique and horizontal positions.

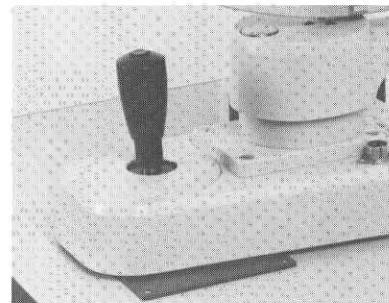


Fig. 32

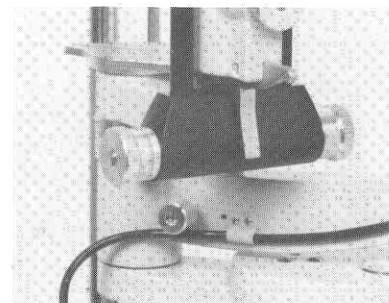


Fig. 33

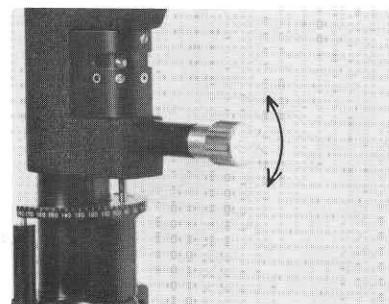


Fig. 34

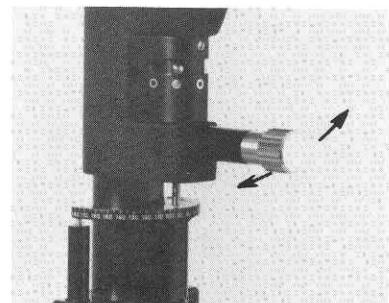


Fig. 35

The oblique and horizontal positions are convenient for gonioscopy and fundus examination in which oblique and horizontal optical sections are required. (See Fig. 35)

(8) Swinging the slit image.

The slit image can be swung across the eye, by loosening the centering knob⑩ and rotating the slit illumination around its vertical axis. Displacing the slit image away from the center of the field of view, in this manner, will produce indirect illumination, retro-illumination, scleral scatter, etc.

The slit illumination will be returned to the center of the field of view, when the centering knob is re-tightened.

The centering knob should be tightened securely for normal examinations. (See Fig. 36)

(9) Inclining the slit illumination system.

Release the slit inclination latch⑨ and pull the lamphouse end towards the operator, which will incline the slit illumination system up to 20° of the vertical.

The slit image will be introduced at an angle of 20° below the horizontal and, with the horizontally-located slit, will have the same effect as swinging the vertical slit image. Inclining the horizontal optical section is particularly valuable for gonioscopy and fundus examinations.

The slit inclination stopper engages the slit inclination latch⑨ at 5° intervals, for producing four angles of inclination, or 5°, 10°, 15° and 20°. (See Fig. 37)

(10) Choice of reflection mirror and the exchange of mirrors.

Two types of reflection mirrors are available for use in deflecting the slit illumination toward the patient's eye, or a long mirror⑦, with a tapered handle end, and a short mirror⑤, which is a simple square. (See Fig. 38)

The long mirror is normally used with the vertical slit illumination for standard types of examinations. However, it may obstruct the line of sight of either objective, either partially or completely, when the slit lamp arm and microscope are used at angles of setting between about 3° to 10°, because of the longer tapered mirror section. Thus, if completely unhindered binocular observation is required at these angle settings, with either the vertical or inclined slit, the long mirror should be exchanged for the short mirror as the shorter mirror will not obstruct the line of sight of the objective.

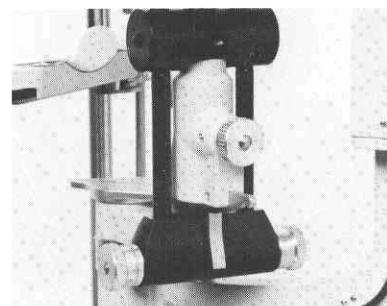


Fig. 36

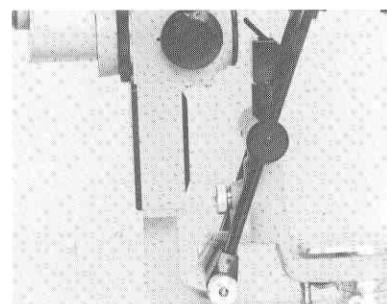


Fig. 37

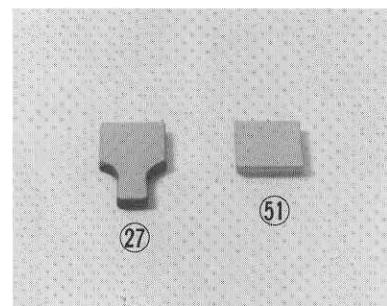


Fig. 38

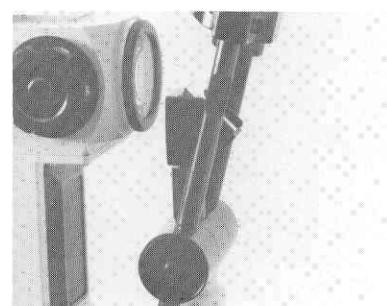


Fig. 39

When using the short mirror, the slit illumination system can be inclined by 10° for reflecting the complete illumination spot. (See Fig. 39)

(11) Insertion of filters.

Four filters are inserted into the light path with the filter lever ⑯ which is simply rotated horizontally, to the right or left, as the case may be, and set to the required symbol or setting.

The symbols are a grey-colored round index (◎) for the heat absorbing filter, a circular index (○) for the 13% neutral density filter, a green-colored round index (●) for the red-free filter, a blue-colored round index (●) for the blue filter and a plain circle which indicates the open aperture.

The blue filter is used for applanation tonometry and examinations with fluorescein, the red-free filter is used for obtaining a green-colored field of greater contrast, the 13% neutral density filter is used for general observation over a wide field with the slit opened to the maximum aperture and the heat absorbing filter is used with the overloaded lamp (when used at H(7.5 volts)) with the opened slit.

(12) Magnification changes

The magnifications of the observation can be changed by simply rotating the magnification changer handle ⑯, i.e., three different total magnifications 6X, 10X, 16X, 25X and 40X with 12.5X standard eyepieces.

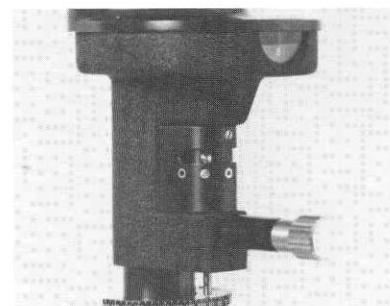


Fig. 40

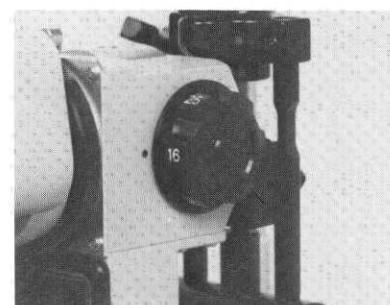


Fig. 41

### 3) Fundus Examination

Only the forward one-third portion of the vitreous body can be examined with the preceding examination, since it is not possible to focus the slit image further into the vitreous body due to refraction by the cornea and crystalline lens.

The Hruby lens, a preset lens of -58.7 diopters, is, therefore, supplied for the examination of the fundus and the posterior part of the vitreous body.

The Hruby lens is used on the Hruby lens attachment mount ⑯ coupled to the Hruby lens guide plate ⑯, which should be fixed on the opening in the rotational axis of the slit lamp arm and microscope arm. When coupled in this manner, the Hruby lens follows all movements of the microscope while its distance to the patient's eye remains fixed, thus greatly facilitating examinations of the posterior segment of the eye with the slit lamp immediately after examining the anterior segment.

(1) No special preparation is required of the patient, if the pupil will stay open wide enough. If not, a few drops of mydriatic may have to be given to the patient's eye about 20 minutes before the examination, in order to keep the pupil dilated suffi-

ciently.

- (2) Place the Hruby lens guide plate⑯ in place on top of the rotational axis of the slit lamp and microscope arms.
- (3) Pull the leverⒶ of the Hruby lens attachment mount⑯ forward which will free the attachment mount⑯ and let it slide laterally below the chin-rest. Locate the attachment mount ⑯ over the Hruby lens guide plate⑯ and insert the shank of the Hruby lens⑯ into the attachment mount⑯, with the lower end of the shank engaging the groove of the guide plate⑯. If necessary, loosen the locking ring to permit the shank to lower sufficiently for coupling. (See Fig. 42)
- (4) Center the slit lamp arm and microscope arm approximately so that they face the patient's eye.
- (5) Depending on whether the patient is myopic or hyperopic, move the Hruby lens forward or backward, with the control leverⒷ, so that a slit image is focused on the fundus. (See Fig. 43)
- (6) When observing the peripheral part of fundus, it will be carried out through the guide of eye by the fixation target or by rotating the microscope around the upright post.
- (7) The elimination of reflecting light will be carried out by changing the slit width, moving the inclination latch and rotating the slit arm.
- When rating the slit lamp arm, the observation will be prevented by the long mirror, therefore the short mirror will be used. (Cf. How to use (10))
- (8) When the Hruby lens is not being used, simply pull the Hruby lens up so that the lower end of the shank no longer engages the coupling groove of the guide plate. Then, move the Hruby lens attachment mount⑯ to the right, as far as it will go, and revolve the leverⒶ to the right, too. The Hruby lens can be left in this position until it is next used. (See Fig. 44)

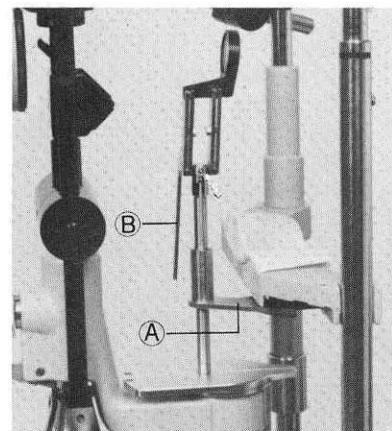


Fig. 42



Fig. 43

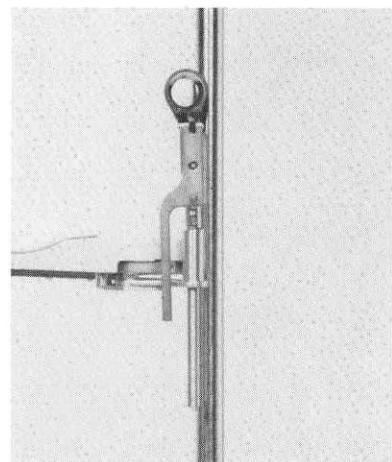


Fig. 44

#### 4) Exchanging the Mirrors

As noted, there are two types of mirrors, or long and short, which can be used interchangeably.

To exchange them,

- (1) Increase the angle between the microscope and the illumination,
- (2) Incline the illumination system about 10°,
- (3) Pull out the mirror.

While the long mirror is easily pulled up, by gripping its tapered end (as in Fig. 45), the short mirror must be pushed up slightly, with the sharp point of a pencil, etc., (as in Fig. 46) before it can be pulled up.

Do not touch the surfaces of the mirrors during exchange and place the unused mirror in its slot of the accessory drawer.

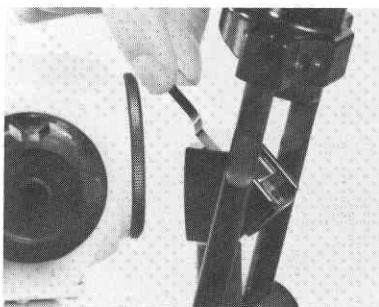


Fig. 45

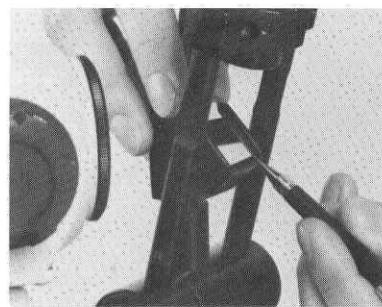


Fig. 46

## 6. CARE AND MAINTENANCE

### 1) Exchange of the Slit Illumination Lamp

For immediate exchange of lamp in failure, follow the steps below with attention given to the hot lamphouse cover and bulbs.

- (1) Set the power switch ④ to OFF.
- (2) Remove the plug connected to lamphouse cover ⑨, raise and remove the cover by turning it counterclockwise. (See Fig. 47)



Fig. 47

- (3) When inserting the new bulb, check that the flange of the bulb is well-seated, or the notch on the flange agrees with the locating plate. Otherwise, slit image will not be uniformly projected. (See Fig. 48)
- (4) Carefully replace the lamphouse cover, press, and insert the plug by turning it clockwise.
- (5) Set the power switch to ON and check that the lamp lights.

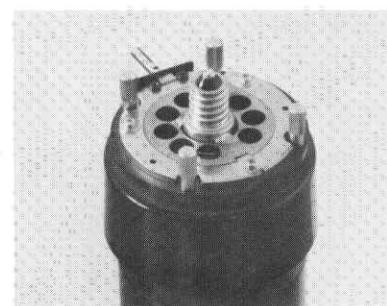


Fig. 48

### 2) Exchange of the Fixation Target Lamp

The fixation target lamp should be exchanged, as follows, by taking off the front target end and exposing the lamp bulb.

- (1) Loosen the knurled knob of the fixation target ④ slightly and detach the target end. (Do not turn the knob too much, as it will become detached.)
- (2) Grip the exposed lamp bulb and pull out until it comes off.
- (3) Replace with a new bulb and check illumination of the target. (See Fig. 49)

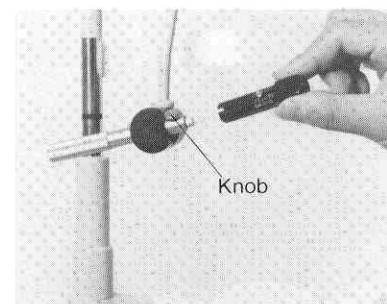


Fig. 49

### 3) Exchange of the Fuse

The fuse should be exchanged, in the following manner, when both pilot lamp and slit illumination lamp⑦ do not light up when the power switch④ is set to ON.

- (1) Turn the power switch ④ to OFF, and remove the power input cord from the AC power supply.
- (2) Turn the center of the fuse holder behind the power supply with a screwdriver, and the cover and the fuse will come out.
- (3) Insert the replacement fuse in the fuse holder and replace the cover.
- (4) Finally, set the power switch④ to ON and check whether the pilot lamp and slit illumination lamp actually light up.

Use a glass-shielded fuse, which is, normally, available on most markets.

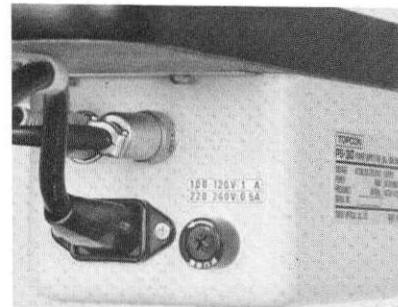


Fig. 50

### 4) Adjustment of the Slit Width Adjusting Wheels

If the slit width adjusting wheels⑧ rotate too freely, even resulting in accidental changes of the slit width, or the movement of the wheels is tight, adjust the friction of the adjusting wheels.

The friction adjustment screw is located in the center of the right-hand slit width adjusting wheel. Therefore, adjust the screw with the minus screwdriver, until the tension is just right. (See Fig. 51) Turning the screw in the clockwise direction will produce a tighter movement while counter-clockwise rotation of the screw will slacken the friction of the wheels.

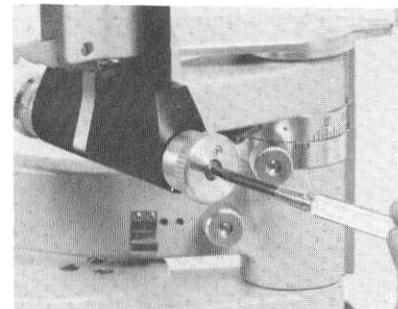


Fig. 51

### 5) Adjustment in the Inclination of the Illumination System

If the illumination system moves too smoothly, adjustment must be made as follows.

Adjustment screws are located on both sides of the rotational axis, as in Fig. 52. Both screws must be adjusted with a minus screwdriver until the proper tension is obtained. and, it should be noted that, both screws must be adjusted by the same amount. As with the slit width adjusting wheels, clockwise rotation will increase friction while counter-clockwise rotation will slacken friction.

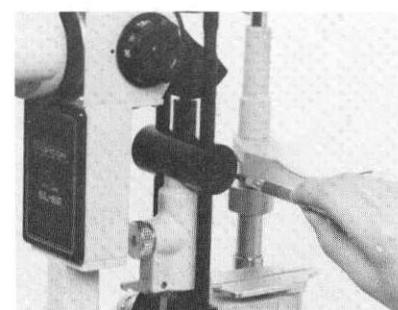


Fig. 52

### 6) Cleaning the Instrument

#### (1) Cleaning the Lenses and Mirrors

As a general rule, the surfaces of the lenses and mirrors should not be touched, as much as possible.

When dirty, try to brush away the dust and dirt with the accessory cleaning brush.

If the lens and/or mirror cannot be cleaned by brushing, however, wipe the surface with a soft, well-washed cotton cloth, linen cloth, etc., which can be lightly dipped into a solution of 4 parts ether and 1 part alcohol. Do not wet the cloth excessively but repeat, if necessary. Furthermore, do not rub the surface but wipe lightly, repeating, if necessary, until the surface is clean. Do not use anything which might scratch the delicate surfaces.

## (2) Cleaning the Condenser Lens of the Slit Illumination

The condenser lens of the slit illumination system may have to be cleaned, if the illumination seems slightly dark.

Remove the plug connected to lamphouse ⑨, raise and remove the cover by turning it counterclockwise.

Next, unscrew the four knurled knobs which will be exposed, as in Fig. 53.

Then, pull up the lamphouse which will expose the surface of the condenser lens. Clean the surface in the same manner noted above.

The lamphouse can only be replaced so that the locating plate, for the lamp's centering base chip, is located on the side of the patient. (See Fig. 53)

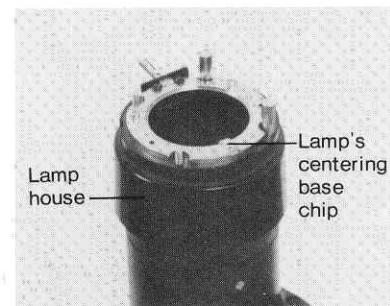


Fig. 53

## (3) Cleaning the Gliding Plate and Rails

The gliding plate⑥ and rails⑦ on the table① must be cleaned from time to time, to insure smooth movement of the base over the table.

Otherwise, if these parts should become dirty, with dust, dirt and other foreign matters, as well as with medicines and other solutions which might drop, the movement of the base over the table area will become heavy.

Clean the gliding plate with the silicon cloth and the rails with a brush. If the former should become too dirty, it can also be cleaned with a cloth soaked in a soapy solution or in detergent, but the gliding plate should then be wiped dry with a clean cloth.

## (4) Cleaning the Plastic Parts

The plastic parts of the instrument, such as chin-rest, head rest, etc., should not be cleaned with any kind of chemical solution.

Use the silicon cloth to keep these parts clean. If further cleaning is required, wipe them with a cloth soaked in a light detergent solution or in soapy water. When cleaned in this manner, however, finish with a clean wet cloth to eliminate any residue and then wipe dry with a clean cloth, too.

## 7. OPTIONAL ACCESSORIES

### 7-1 35mm PHOTOGRAPHIC ATTACHMENT SET

#### 1) Nomenclature

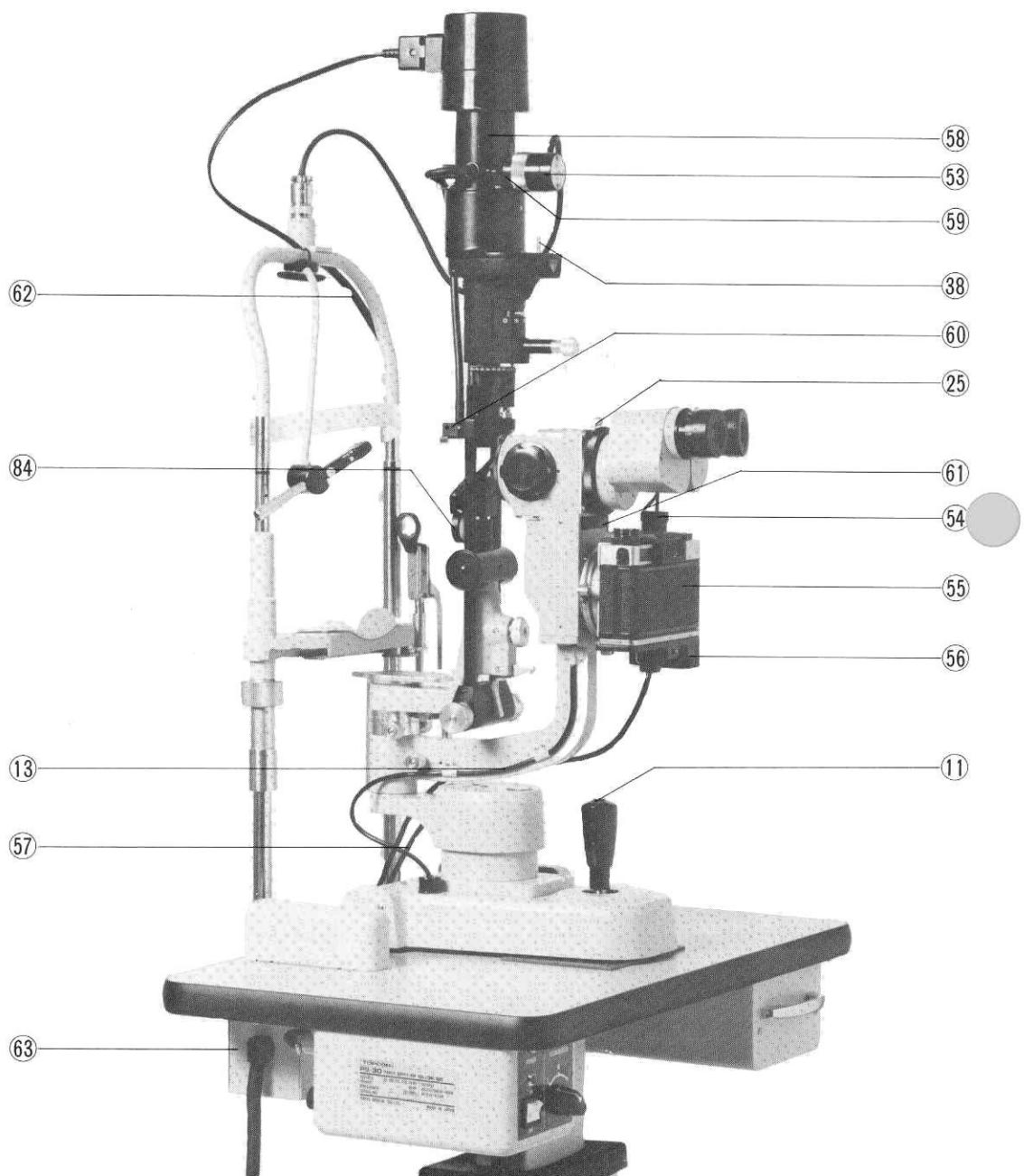


Fig. 54

- |  |   |
|--|---|
| (53) Trigger coil                                | (13) Connected cord                       |
| (38) Setting pin for background illumination     | (62) Xenon relay cord                     |
| (25) Beam splitter lever                         | (63) Cord relay box                       |
| (54) Solenoid release                            | (64) Power supply box                     |
| (55) 35mm camera body                            | (65) Flash control switch                 |
| (56) Auto winder                                 | (66) Power switch                         |
| (11) Release button                              | (67) Pilot lamp                           |
| (57) Base relay cord                             | (68) Charge lamp                          |
| (58) Relay lens                                  | (69) Consent                              |
| (59) Xenon lamp                                  | (70) Voltage selector/fuse holder         |
| (60) Background illumination                     | (71) Power cord                           |
| (61) Normal (Full frame) photographic attachment | (72) Camera fixing lever                  |
|  | (73) Attachment fixing lever (See Fig.56) |

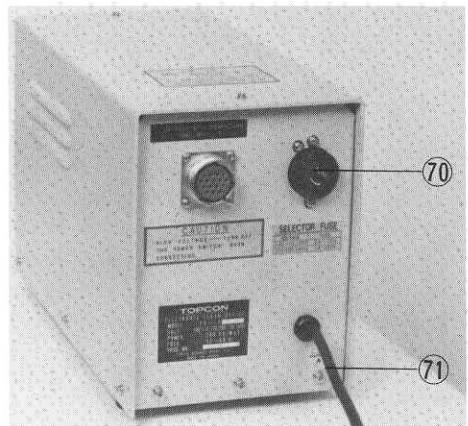
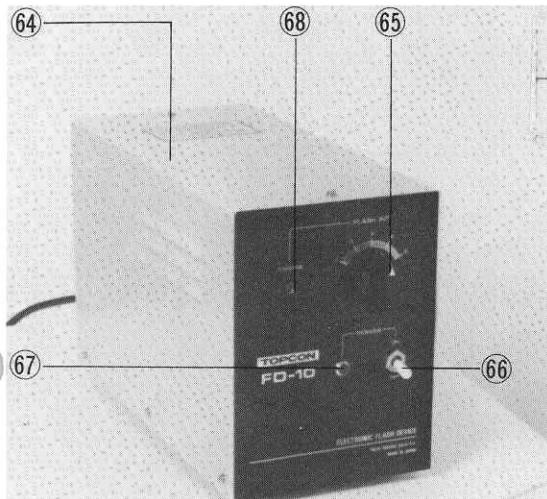


Fig. 55

Normal (Full frame)  
photographic attachment

Stereo photographic attachment (It  
is available at extra cost against 35  
mm photographic Attachment set)

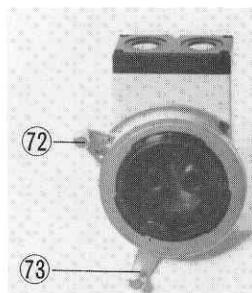
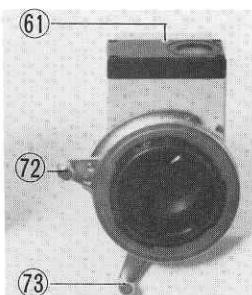


Fig. 56

- 74 Film winding lever  
 75 Exposure counter  
 76 Shutter release button (camera)  
 77 Rewind crank  
 78 Back cover opening knob  
 79 Rewind button (camera)  
 80 Auto winder switch  
 81 Red lamp  
 82 Auto winder cord  
 83 Illumination control lever

84 Diffusion lens

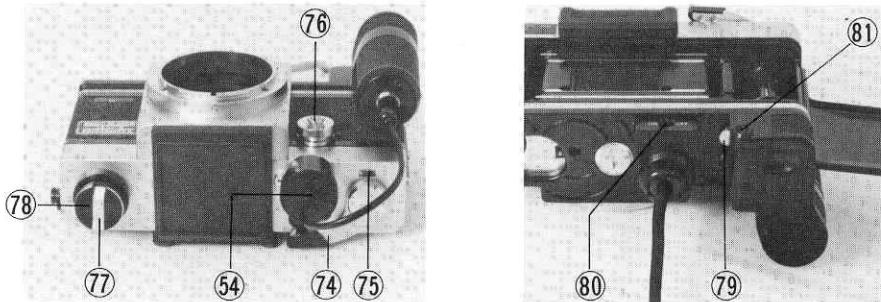


Fig. 57

## 2) Assembling and Installation

Once everything has been unpacked, check the contents against the following list.

Contents	Quantity
64 Power supply box	1 each
55 35mm camera body with auto winder	1 each
54 Solenoid release	1 each
61 Normal (full frame) photographic attachment	1 each
58 Relay lens	1 each
60 Background illumination	1 each
59 Xenon lamp	1 each
53 Trigger coil	1 each
63 Cord relay box	1 each
62 Xenon relay cord	1 each
57 Base relay cord	1 each
84 Diffusion lens	1 each



Fig. 58

### 3) Attachment of the Photographic Unit

#### (1) Attaching the Relay Lens

- (a) Remove the plug connected to lamphouse ⑩, raise and remove the cover by turning it counterclockwise.
- (b) Unscrew four knurled lamphouse attachment screws and pull the lamphouse up. (See Fig. 59)
- (c) Unscrew four spacer bars and detach. (See Fig. 60)
- (d) Unscrew four spacer ring fixing screws and then detach the spacer ring. (See Fig. 60 and Fig. 61)
- (e) Unscrew four attachment screws on the top surface of the relay lens section and use them to attach the relay lens section in place of the spacer ring on top of the condenser lens. (See Fig. 62)
- (f) Next, screw in the four spacer bars in the screwholes from which the four attachment screws were detached in (e). Then, assemble the lamphouse, illumination bulb and lamphouse cover, in the reverse order of (a) and (b).

**Note:** The four spacer ring fixing screws and the spacer ring will no longer be required, once the relay lens section is assembled in the above manner.

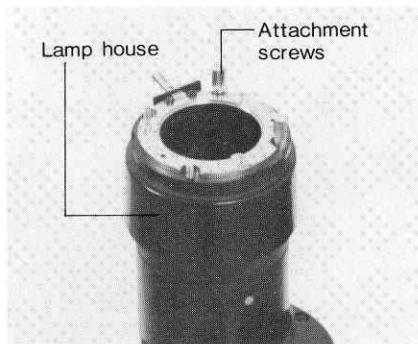


Fig. 59

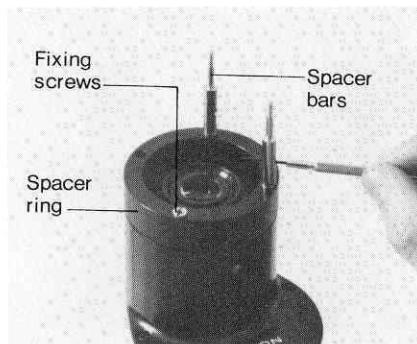


Fig. 60

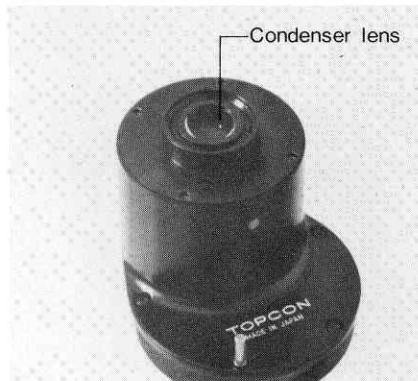


Fig. 61

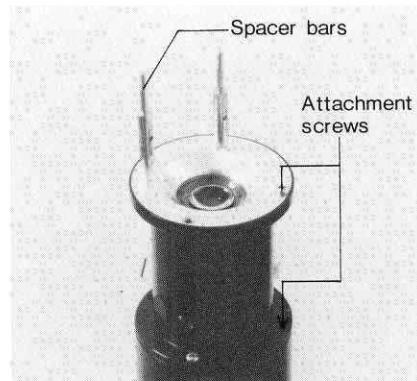


Fig. 62

## (2) Attachment of the Background Illuminator

- (a) Insert the pins of the background illuminator into receptacles at the lower end of the illumination section. (See Fig. 63)
- (b) Loosen the setscrew on the side of the relay lens section and detach the plug. (See Fig. 64)  
Insert the end of the optical fiber light guide from the background illuminator into the opening (from which the plug was taken out) and then fix securely with the setscrew.  
Hook the optical fiber light guide on its hook, to keep it from dangling. (Fig. 64)

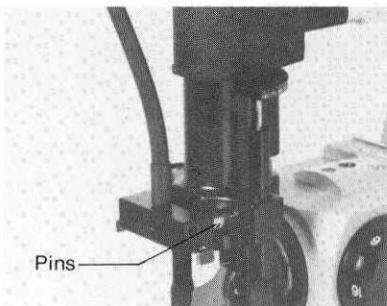


Fig. 63 -

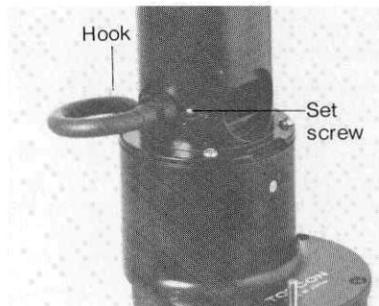


Fig. 64

## (3) Attachment of the Cord Relay Box

Fix the flange of the cord relay box securely with the four wood screws (See Fig. 65)

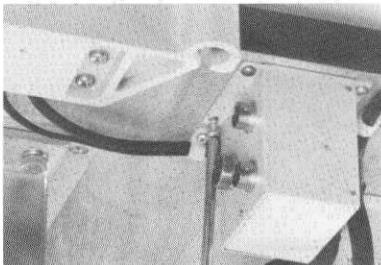


Fig. 65

## (4) Attachment of the diffusion lens

Remove the mirror stopper plate from the mirror seat and install ⑧ with two screws supplied with it in a manner as shown in the figure.

Note: Do not come in contact with the reflection mirror. (Removed two screws and the stopper become useless.)

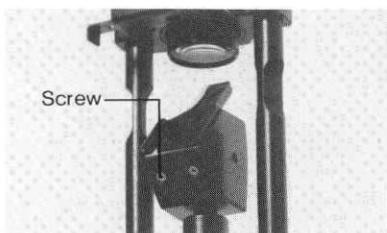


Fig. 66



Fig. 67

### (5) Connecting the Xenon Relay Cord

- (a) Take off two screws of the upper part of the chin rest.  
Fix it by those two screws as shown Fig. 68.
- (b) Fix the cord at three points by the cord holder of the pole of chin rest and the screws of the pole. (See Fig. 68)
- (c) Connect the other end of the cord to the cord relay box.

### (6) Attaching the Xenon Flash Lamp

- (a) Take off the ring of the trigger coil<sup>53</sup> and insert the Xenon lamp<sup>59</sup> and fix it with the ring (See Fig. 69)

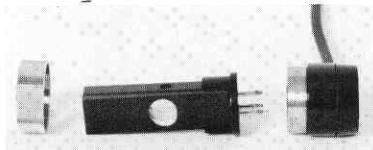


Fig. 69

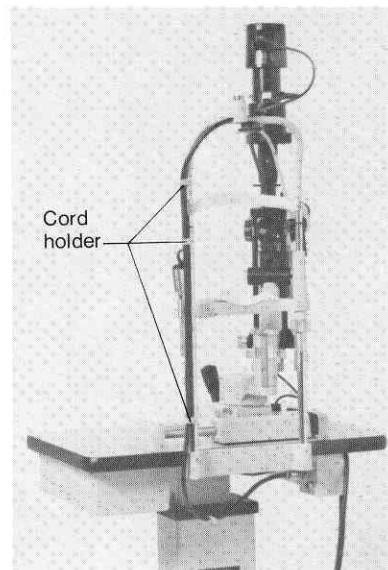


Fig. 68

- (b) Insert the Xenon flash lamp into the square opening on the side of the relay lens section, from the user's side so that the connecting cord will be on the top side. Then, fix it with the setscrew on the right side.
- (c) Connect the other end of the connector cord to the connector on the top frame of the chin-rest and head rest section.

There is an opening on the side of the Xenon flash lamp for siphoning light off for the background illumination.

Therefore, if this opening is located on the side of the optical fiber light guide, the connecting cord from the Xenon flash lamp will be oriented on the top.

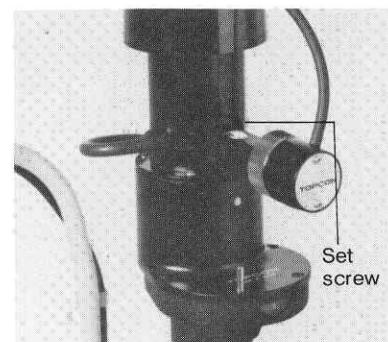


Fig. 70

### (7) Attaching the Photographic Attachment

- (a) Push out the cover under the microscope from the illumination section to this side and remove it.

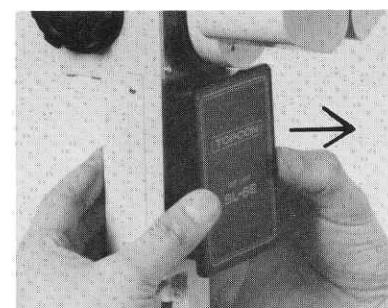


Fig. 71

- (b) Move the attachment fixing lever<sup>73</sup>, on the bottom of the camera attachment mount(of the photographic attachment), to the left, insert the photographic attachment into the box frame opening below the binocular microscope and then move the fixing lever to the right, which will fix the attachment securely. (See Fig. 72)

### (8) Attaching the Camera Body

- (a) Screw in the solenoid release<sup>54</sup> . Connect the cord which comes from solenoid release with the auto winder (See Fig. 73)
- (b) Move the camera fixing lever, on top of the camera attachment mount of the photographic attachment, upwards, insert the camera body mount over the camera attachment mount and then lower the fixing lever which will fix the camera body securely. (See Fig. 74)

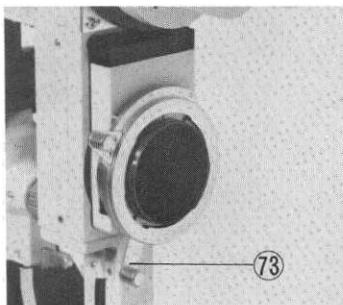


Fig. 72

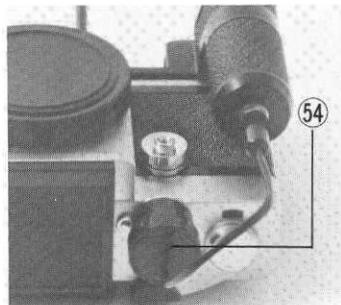


Fig. 73

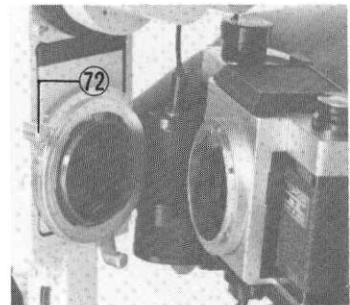


Fig. 74

### (9) Connecting the Cords

- (a) Base relay cord  
Connect one end to the connector on the base and the other end to the cord relay box. (See Fig. 75)
- (b) Auto Winder cord  
The connector cord from the Auto Winder should be connected to the cord relay box, with the dangling cord hooked on a hook available on the microscope arm.(See Fig. 75)
- (c) Confirm if the voltage selector<sup>70</sup> of photographing power supply has been set to the fixed voltage.  
The connector cord from the cord relay box should be connected to the Power Supply. As the ground wire comes out of the power supply plug of power cord<sup>71</sup>, be sure to ground such wire.

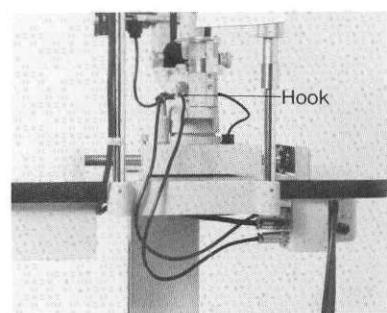


Fig. 75

#### 4) How to Use a Photographic Attachment

##### (1) Loading Film in the Camera Body

- (a) Open the back cover of the camera body by pulling-up the back cover opening knob 78 .  
The back cover will spring open if it is not being pressed. (See Fig. 77)
- (b) Pull up the cover opening knob 78 fully.  
Place a fresh film cartridge in the empty film chamber and push the rewind knob back into engage the film cartridge.  
If necessary, rotate the cover opening knob slightly so that the two engage fully. (See Fig. 77)
- (c) Pull out the leading end of the film and insert it deeply into one of the multi-slots of the take-up spool. (In case of stopping winding lever, depress the shutter release button)  
Revolve the serrated flange of the film take-up spool so that the film perforations at the top and bottom fully engage the film transport sprocket teeth.  
Once the perforations are fully engaged, in the above manner, close the back cover, by simply pushing it in until it catches and is locked securely. (See Fig. 78)

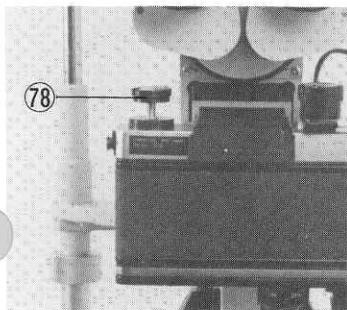


Fig. 76

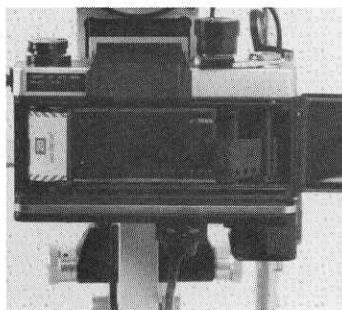


Fig. 77

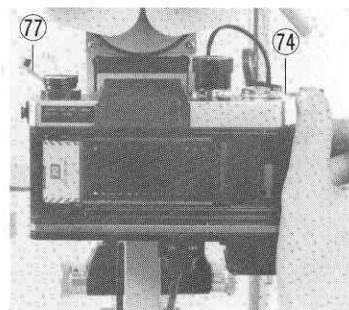


Fig. 78

- (d) Rotate the rewind crank 77 in the arrow indicated direction slowly, which will take up any slack of the film in the cartridge.  
Push the film winding lever 74 until it makes a full stop, while, at the same time, checking whether the rewind knob is rotating counter-clockwise. (thus showing that the film is being advanced properly)
- (e) Depress the shutter release button.  
A blank shot will be taken and then the film will be advanced one frame, with the shutter and exposure counter being charged and advanced respectively, too.  
Repeat the blank shot once more which will normally take care of any frames which may have been exposed during film loading.  
Then, the exposure counter 75 shows "1".

##### (2) Exposure Counter

The exposure counter 75 on the camera body requires no adjustments because it is automatic.  
Whenever the back cover of the camera body is opened, the exposure counter automatically returns to the starting-mark, i.e., white dot index.  
The exposure counter is additive and shows the number exposed.

##### (3) Changing of Photographic Magnification

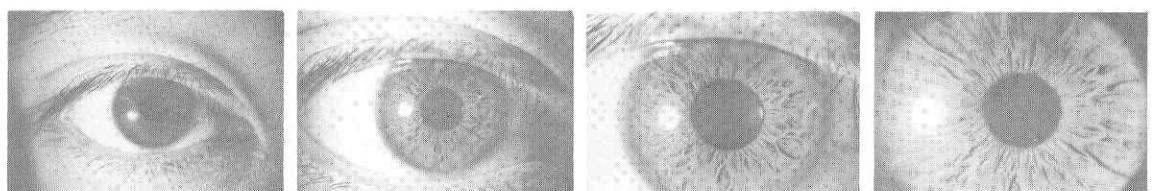
Photographic magnification can be changed by rotating the magnification changer

handle ②.

Low magnification (6X magnifications) is assumed to be nonconformance due to low photographic magnifications and small illuminated field.

Observation	Normal(full frame) Photography	Stereo Photography
10×	0.9×	0.6×
16×	1.4×	1 ×
25×	2.2×	1.6×
40×	3.5×	2.6×

Normal (full frame) Photography



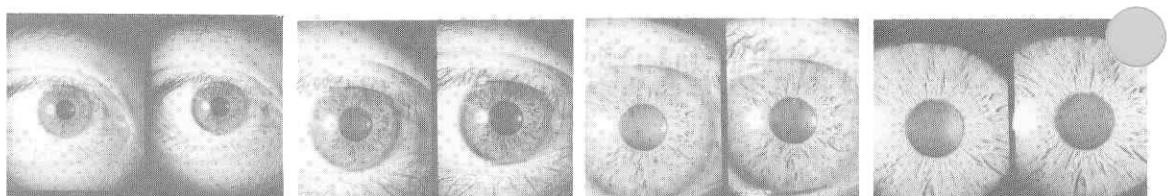
0.9×

1.4×

2.2×

3.5×

Stereo Photography



0.6×

1×

1.6×

2.6×

Fig. 79

#### (4) Background Illumination

(a) In case of slit photography, when photographing the background to know what position of eye is cut by slit, in case of photographing the ocular anterior which requires a large field of illumination and in case of conjunctive photographing which requires only low quantity of light the background illumination is used.

(b) The background illumination is adjustable for high or low, or may also be blacked out, with the following adjustments, as seen from the user's side. (See Fig. 81)

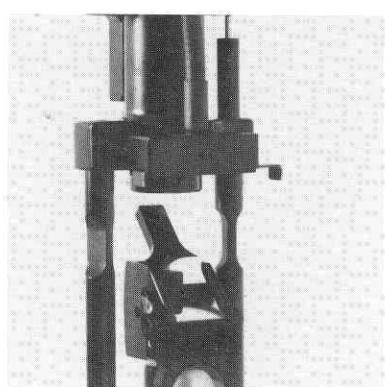


Fig. 80

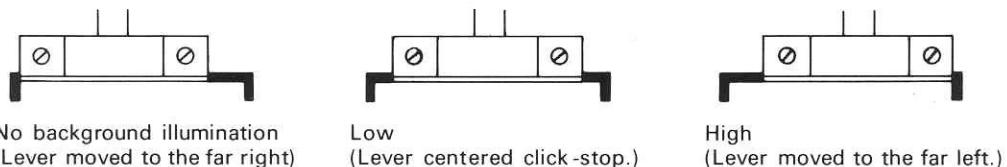


Fig. 81

- (c) The background illumination will not be reflected by the mirror into the patient's eye.
- (d) The background illuminator may hit the patient's forehead, when the slit illumination system is inclined. In such cases, therefore, detach the background illuminator (refer to Attachment of the Background illuminator), wrap it around the slit illumination system and store the background illuminator on the setting pin for the background illumination ⑧ over the slit mechanism (See Fig. 82)

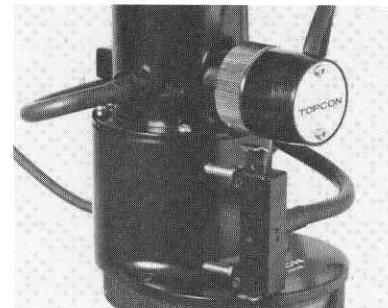


Fig. 82

#### (5) Exposure Guide for Photography

The correct exposure is affected by the subject and the photographic magnification. Therefore, the correct exposure will be decided the adjustment of slit width, flash intensity, the background illumination and the diffusion lens illumination.

The following table indicates the standard exposure with the normal eye of brownish iris, 0.1mm of slit width.

The recommended film is Daylight, ASA 200, transparency film.

The actual photography is for affected eye, so the correct exposure will vary depending upon the photographic position and the condition of the patient. You are, therefore, requested to rectify according to the standard value.

Photographic magnification	0.9X	1.4X	2.2X	3.5
(Enclosed are magnification of microscope)	(10X)	(16X)	(25X)	(40X)
Corneal and Crystalline (Slit width 0.1mm)	4	5	5	
Ocular anterior	Background illumination...H	5	5	
	Diffusion lens illumination	3	3	
Iris	Slit fully open (9mmφ)		★ 2	★ 3
	Diffusion lens illumination		4	5
Conjunctiva	Background illumination...H		3	5
	Diffusion lens illumination		1	2

- Numerals in Table indicate the flash intensity.
- Please reduce the value one step for stereo photography.
-  indicates insufficient illumination, small illuminated field or non-conformance of photographic range.
- ★ This is a photograph within a range of illumination field of 9mmφ.

(a) How to use background illumination.

- For slit photography of corneal and crystalline, use the background illumination according to the conditions as follows.

H: To take a photograph which is bright all over.

(Note: that 25X is assumed to be L due to insufficient illumination).

L: When the periphery is to be photographed to the extent the slit location can be observed.

O: (Close) when slit location can be observed.

- When photographing ocular anterior and conjunctiva, open the slit and immediately close it the instant the focusing is complete.

(b) When using a diffusion lens, fully open the slit (9mm) with the background illumination closed.

#### (6) Photography

The shutter release button is on the top of the control lever, with the shutter actually released by the solenoid release screwed into the cable release socket of the camera shutter release button, while the film is advanced and the shutter is charged with the Auto Winder attachment.

The Auto Winder, solenoid release and connector cords must, therefore, all be connected securely for photography to take place.

#### IMPORTANT

The lever over the binocular microscope must be pushed IN for photography. When left OUT, the shutter will not be released and the Xenon flash lamp will not illuminate. (See Fig. 83)

\* When you push the release button ⑪, confirm that the charge lamp ⑬ of power supply for photographing is illuminated. The charge lamp will be illuminated within 5 minutes after xenon lamp was lighted.

\* When you pushed the release button, you have to keep your hands off immediately. Keeping on pushing may overheat the solenoid release, which would cause some damage.

\* Do not push the release button while the film is being wound up by auto winder. If you do, the auto winder may stop in the way of winding the film up. At such a time, the red lamp ⑬ of auto winder remains illuminated (In normal case, the red lamp is illuminated only while the auto winder is in action) In such a case, you are requested to wind it up by winding lever ⑭. When the film is wound up, the red lamp turns off, returning to normal condition.

\* Refrain from photographing beyond the limited number of film. If you do, the following matters would occur :

The red lamp ⑬ of auto winder remains illuminated. Turn the auto winder switch ⑩ to OFF and rewind the film.

The perforation of film is, rarely, broken, it is feared that photographing should be kept outwardly in spite of the completion of film. (See Fig. 84)

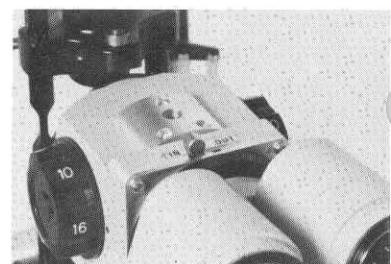


Fig. 83

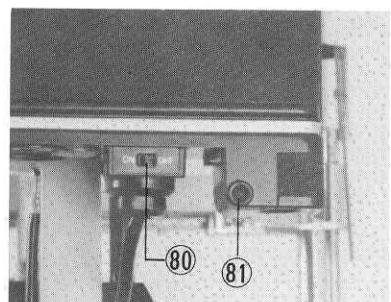
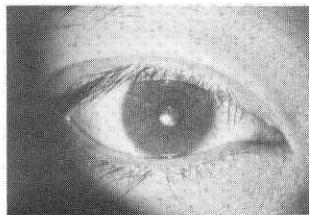


Fig. 84

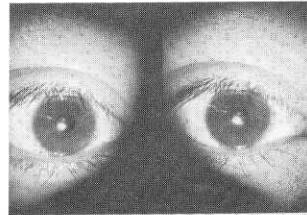
(7) **Obstruction by mirrors and pole**

When putting the microscope and illumination in a straight line (open angle  $0^\circ$ ), the picture will be obstructed as shown in the figure on the right by the long mirror ⑦. (See Fig. 85)

When moving the illumination to the microscope, be careful obstructing by the long mirror and the pole. (Normal photography is to be carried out by the right eye of microscope while the stereo photography is to be carried out from both eyes.)



Normal Photography



Stereo Photography

Fig. 85

(8) **Unloading the film**

- (1) Fully depress the film rewind button ⑨ at the bottom of the auto winder.
- (2) Raise the rewind crank ⑦ and rotate it counterclockwise until recognizing a clicking sound of the film being slipped off the sprocket groove (sudden release of tension is felt).
- (3) Raise the back cover opening knob ⑧ and remove the film.

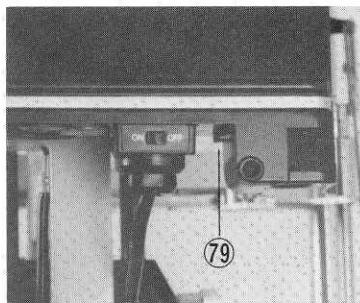


Fig. 86

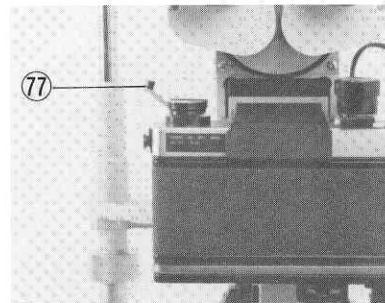


Fig. 87

## 7-2 POLAROID ATTACHMENT Model PA-8S

When the polaroid attachment is used in place of the 35mm camera body of the photographic attachment, instant color photographs with Polaroid Type 779 High Speed Color Film (ASA 600) are obtained. Full-frame prints measuring 79mm X 78mm are developed in 90 seconds at magnifications of 1.3X, 2.2 X, 3.4 X, 5.4 X and 8.8X. (The Polaroid Attachment can not be used with the Stereo photographic attachment.)

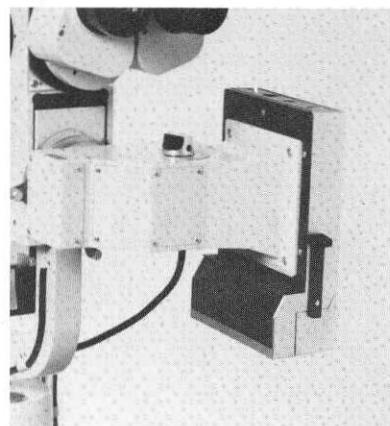


Fig. 88

## 7-3 OBSERVATION TUBE

Supplied with Beam Splitter 50 and 12.5X eyepiece, with observation tube attachable on either side of the beam splitter. Has image rotation ring for proper orientation of the field of view. The observation tube may be left attached, even during slit lamp photography, by simply flipping the beam splitter out of the optical path.

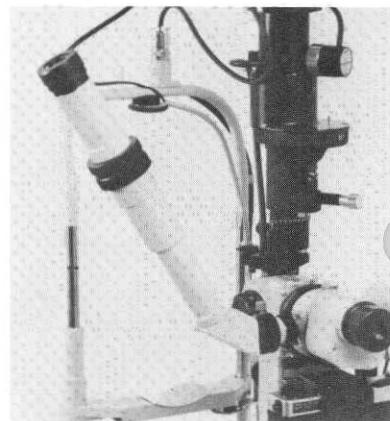


Fig. 89

## 7-4 VIDEO ATTACHMENT

The Video Attachment permits the use of a compact color video camera to obtain videotape recordings as well as for use in closed-circuit television systems. Magnifications at either the 2/3" or 1" vidicon surface are 0.3 X, 0.4 X, 0.7 X, 1.1 X, and 1.7 X. The built-in iris aperture control permits adjustments of F11, F16, and F22.

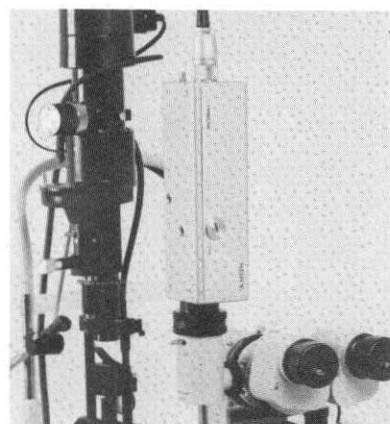


Fig. 90

## 7-5 NON-CONTACT SPECULAR ATTACHMENT

The Specular Attachment allows for the non-contact monocular observation of the corneal endothelium. The use of anesthesia is not required as a 15mm working distance between the objective lens surface and corneal vertex is maintained. The slit lamp's magnification changer provides observation powers of 110 X, 176 X, 282 X, and 453 X while the 35mm photographic magnifications are 9.5 X, 15 X, 24 X and 39 X. The area being photographed is 1.0 X 0.16mm.

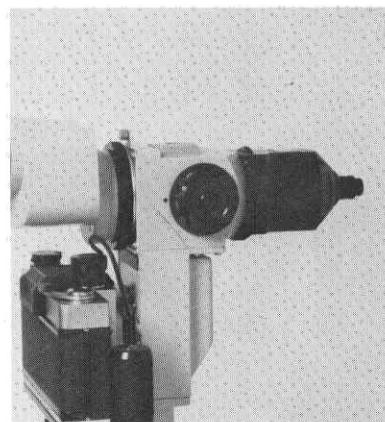


Fig. 91

## 7-6 PACHOMETER ATTACHMENT

The Pachometer attachment provides accurate measurements of the corneal thickness Model 1. Two LED's are incorporated in the system to insure repeatable alignment of the slit beam. With the Mishima-Hedbys Method, the slit beam can be accurately positioned, perpendicular to the corneal surface. To further assist the practitioner in obtaining precise readings, the scale is illuminated by a third LED and a reading loupe is permanently attached to magnify the scale graduations. The corneal measuring range, with the Model 1, is from 0 to 1.2mm in 0.02mm increments. The observation of the optical section is at 12.8 X magnification.

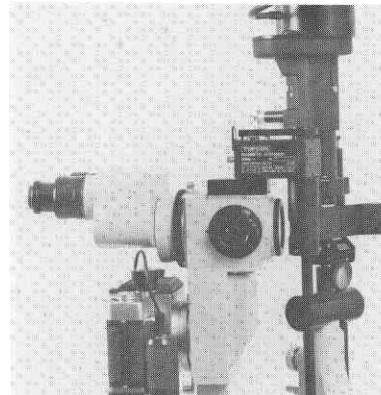


Fig. 92

## 7-7 12.5 X MEASURING EYEPIECE

Used interchangeably with one of the standard 12.5 X eyepieces. Scale around the circumference is graduated at every 5°, for alignment with toric cylinder lenses, while a straight millimeter scale is available through the center of the field of view.



Fig. 93

## 8 . OTHER TROUBLES AND PARTS ORDER

### 1) Before Calling for Help

If the instrument does not work, please check the following, before calling for help.

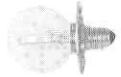
- \* Check whether all connector cords and/or cables are correctly and securely connected.

- \* Check the fuse holder and replace blown-out fuses.

- \* Check the illumination lamp, fixation target lamp and also xenon flash lamp and replace, when necessary.

### 2) Spare parts

When ordering spare parts for the SL-6E, please give the following full name and parts number, as well as the quantities.

Description	Parts Number	Appearance
Illumination tungsten bulb	4031025611 4031025620	
Fixation target bulb	4035042110	
Xenon flash lamp	4036540000	
Chin-rest pads	4031040820	

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